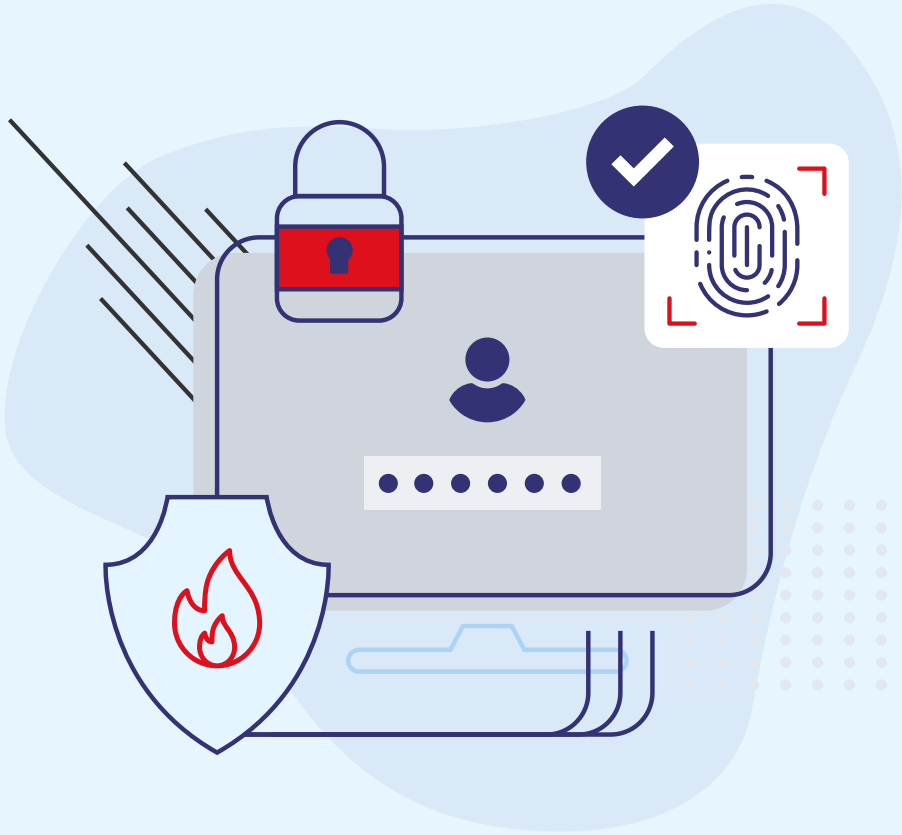
CyBOK

The Cyber Security Body of Knowledge

Mappings of University and Professional Training Programmes to CyBOK

Mapping Booklet Version 2.1
Mappings are based on either CyBOK v1.0.0 + Formal Methods for Security or CyBOK v1.1.0

Contents



Introduction

This booklet includes mappings of a number of education and training programmes: postgraduate and undergraduate degrees at higher education institutions certified by the National Cyber Security Centre (NCSC), and professional certification programmes. The spider charts and bar charts indicate the breadth and depth of coverage of various CyBOK Knowledge Areas (KAs) in CyBOK v1.0.0 (with the addition of a 20th KA on Formal Methods for Security) or CyBOK v1.1.0.

The purpose of the booklet is to show how different programmes contrast. The mappings enable:

- **Employers** to identify if the students from a programme or certification will be well-placed to meet the knowledge requirements of a particular role; and
- **Learners** to identify which programme or certification may best suit their learning and career needs.

The mappings for university programmes are provided by the universities with NCSC certified degrees. The mappings were reviewed by an NCSC convened Assessment Panel as part of the certification process and/or reviewed by NCSC as part of the annual management information returns from all certified degree holders. The mappings of professional certifications were conducted by the CyBOK team and full datasets are available on the CyBOK website for review and further analysis.

Mapping framework

The mapping framework requires a list of concepts – typically in the form of key words or phrases (KWoPs) that represent the concepts covered in the programme material – that are to be mapped on to CyBOK.

A user starts by looking up a KWoP using the CyBOK Mapping Reference and any other additional look up material that may have been developed in order to identify the relevant KA (or Introduction to CyBOK) where the content may reside. The Knowledge Tree is then studied to identify the relevant concept within CyBOK. N.B. the purpose here is not to do an exact string matching but to identify the topic or sub-topic within a knowledge tree to which a KWoP maps. If a suitable node cannot be found within the Knowledge Tree, then the full text of the CyBOK Introduction or KA is studied to identify the mapping.

If the CyBOK mapping reference cannot identify a suitable Knowledge Tree, then the tabular representation is used to identify the most suitable KA or KAs and the relevant Knowledge Trees and KA content are studied to identify the mapping.

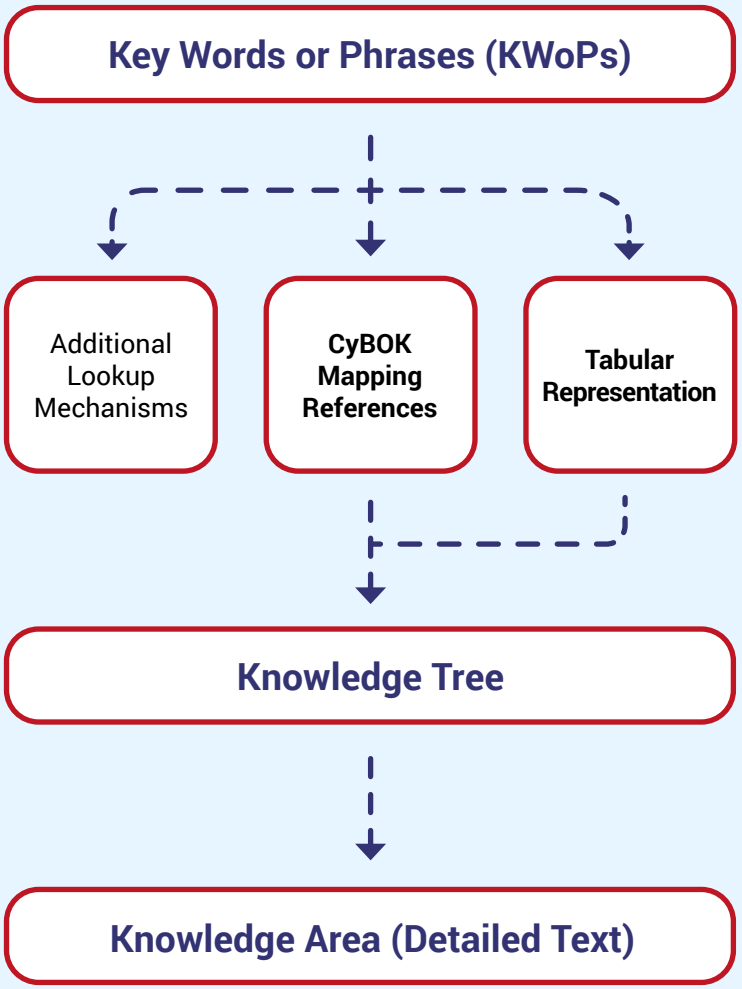


Figure 1: The General Mapping Framework

NCSC Degree Certification

The UK's National Cyber Security Centre (NCSC) has established a programme for the certification of degrees in cyber security: **www.ncsc.gov.uk/information/**

Starting in 2020, the CyBOK Knowledge Areas (KAs) have been used to define the requirements for the cyber security taught content in a number of NCSC certification standards as shown in Tables 1 and 2 below[1].

Postgraduate degrees using CyBOK Table 1

Standard	Total number of credits in degree, typically	Total number of taught credits, typically	Certification requirement for taught cyber security content
Master's in Cyber Security	**180**	**120**	At least **84** taught credits that can be mapped to the CyBOK KAs
Master's Incorporating Cyber Security	**180**	**120**	Between **20** and **60** taught credits that can be mapped to the CyBOK KAs

[1] In the UK, one credit equates to a notional 10 hours of learning by a student.

Undergraduate degrees using CyBOK Table 2

Standard	Total number of credits in degree, typically	Certification requirement for taught computer science content	Certification requirement for taught cyber security content
Integrated Master's in Computer Science and Cyber Security	**480**	At least **180** taught credits that can be mapped to the standard's computer science Subject Areas	At least **105** taught credits that can be mapped to the CyBOK KAs
Bachelor's in Computer Science and Cyber Security	**360**	At least **135** taught credits that can be mapped to the standard's computer science Subject Areas	At least **90** taught credits that can be mapped to the CyBOK KAs

NCSC also has a certification standard that addresses the computer science underpinning cyber security – Computer Science for Cyber Security. Examples of the mapping of such degrees to CyBOK are provided in the following pages.

Acknowledgements

The NCSC would like to thank all of the universities with NCSC certified degrees for permission to display their data in this booklet.

Mapping Taught Credits in NCSC Certified Degrees to CyBOK

The distribution of taught credits across the CyBOK KAs provides a very simple, yet powerful, way to characterise the taught content of those degrees in cyber security that have achieved NCSC certification. On the following pages the taught content of the certified degrees from 40 UK universities is displayed in the following two formats:

i. As histograms, where for each KA the number of taught credits in that KA is plotted.

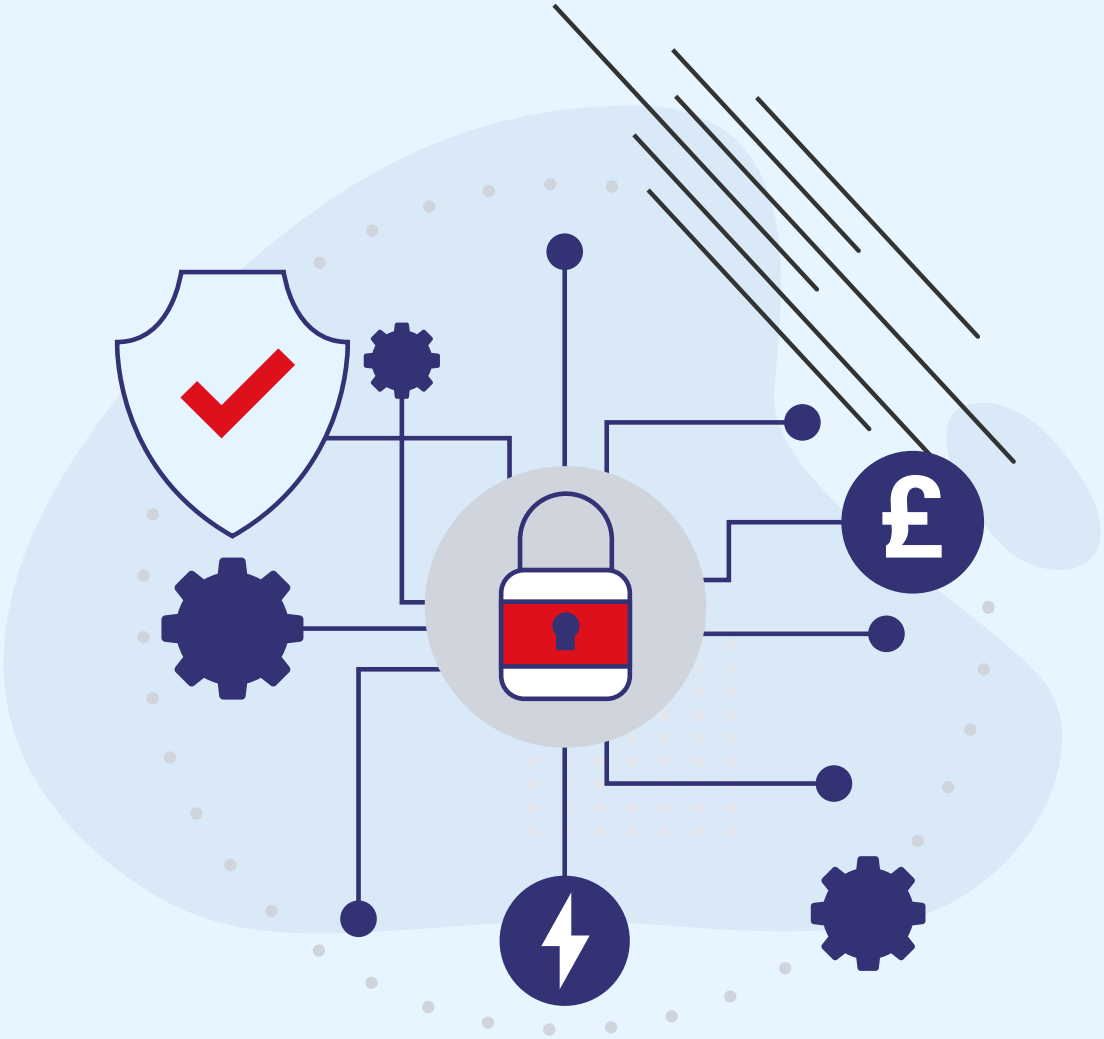
ii. As spider charts, where for each broad category of CyBOK the number of taught credits in that broad category is plotted radially.

A number of the degrees on the following pages have several pathways through the degree that meet the NCSC certification standards – these are a result of optional modules being available to students. Given limitations on space, those degrees that have several pathways are highlighted but only one pathway is displayed.

Readers should note that the taught content of degree programmes will evolve over time and the certification status of degrees may also change. Thus what is presented in the booklet should be regarded as a snapshot in time. Readers requiring further information should look at the websites of the universities concerned and the NCSC.

A note on the scales used

- **For histograms,** the vertical lines are at 0, 10, 20 and 30 credits.
- **For spider diagrams,** the circles are at 40 and 70 credits.



Mappings of Professional Training Programmes and NCSC Certified Degrees

The mappings enable one to establish how cyber security coverage in professional certification programmes and NCSC certified degrees maps to CyBOK.

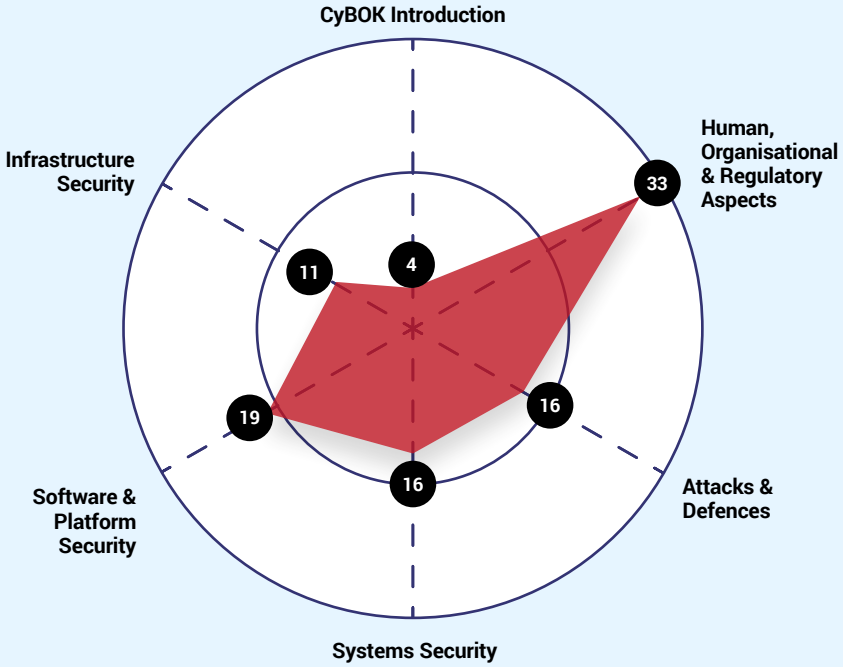
The spider charts show a bird's-eye view of coverage across broad CyBOK categories, and the bar charts show a deeper view on a per-KA basis.

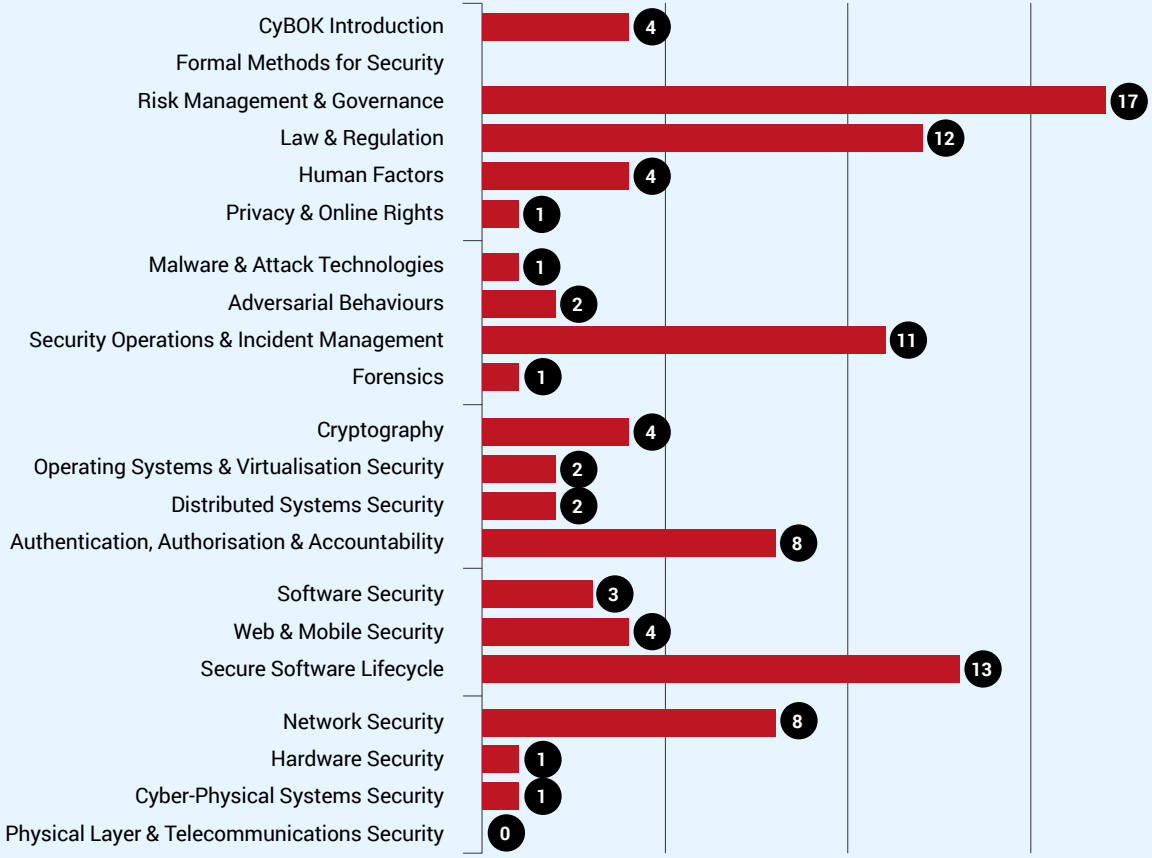
Mapping can also be undertaken on a finer-grained level, for example on particular knowledge domains covered by certifications. An exemplar mapping of CISSP and its method can be found here.

Please note: some of the percentages may have been rounded up or down which means the sum may not equal 100%. For histograms, where a 0 is shown, this is an effect of rounding down. Where there is no number, this indicates no coverage.

CISSP

Certified Information Systems Security Professional - (ISC)²



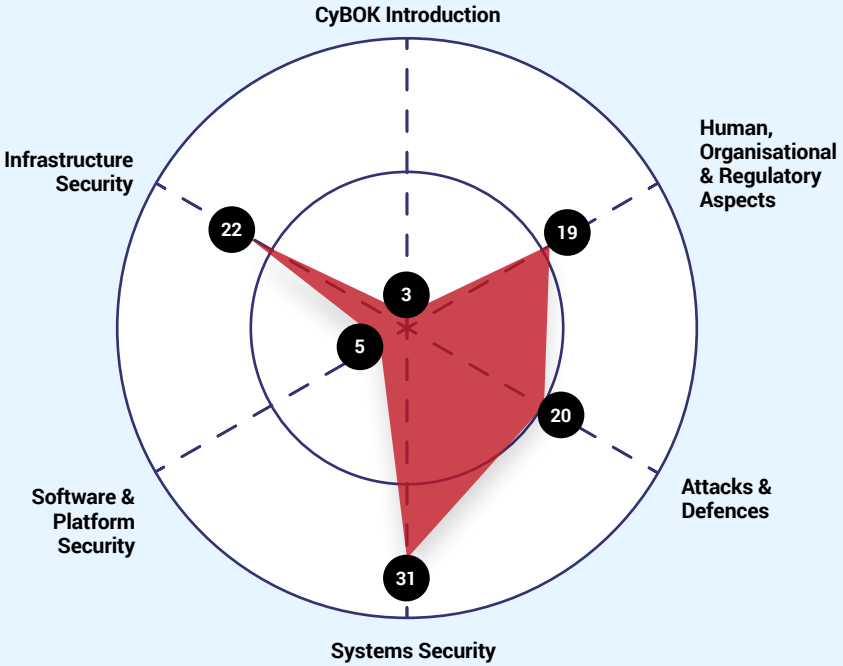


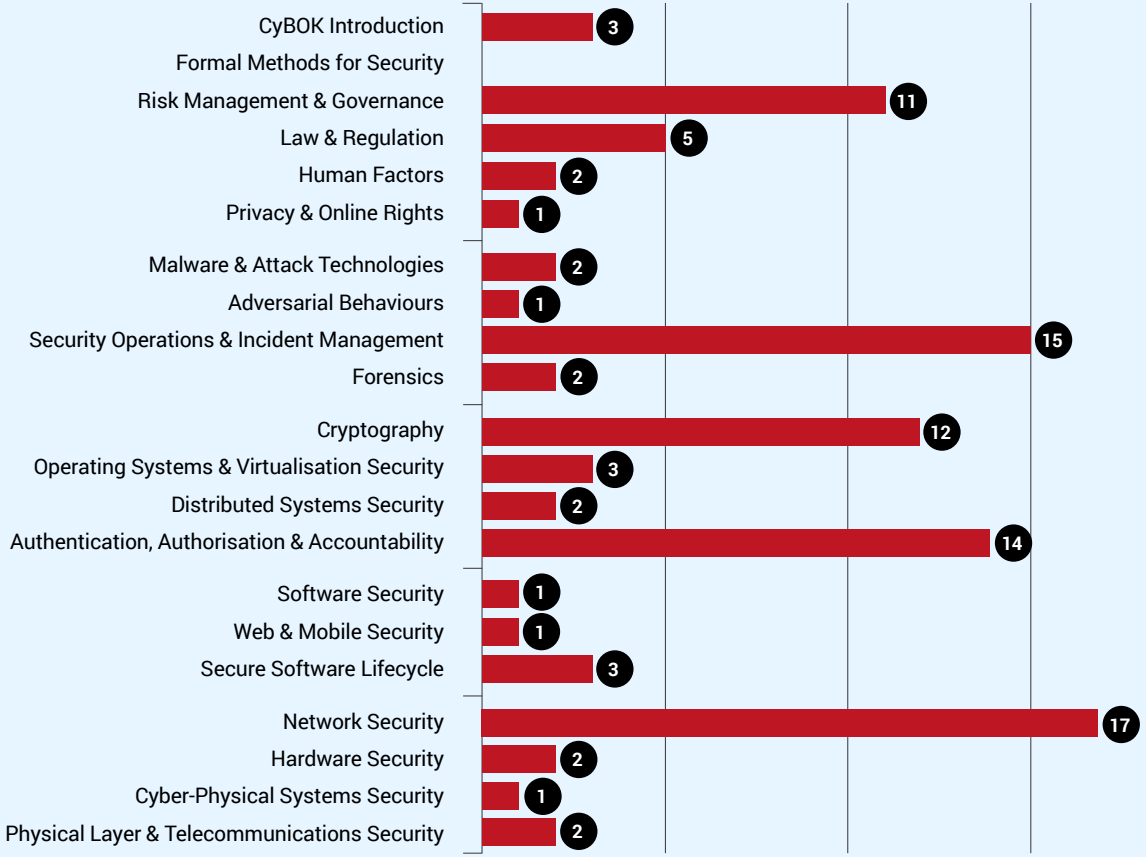
Mapped to CyBOK v1.0.0 + Formal Methods for Security

Percentage %

SSCP

Systems Security Certified Practitioner - (ISC)²



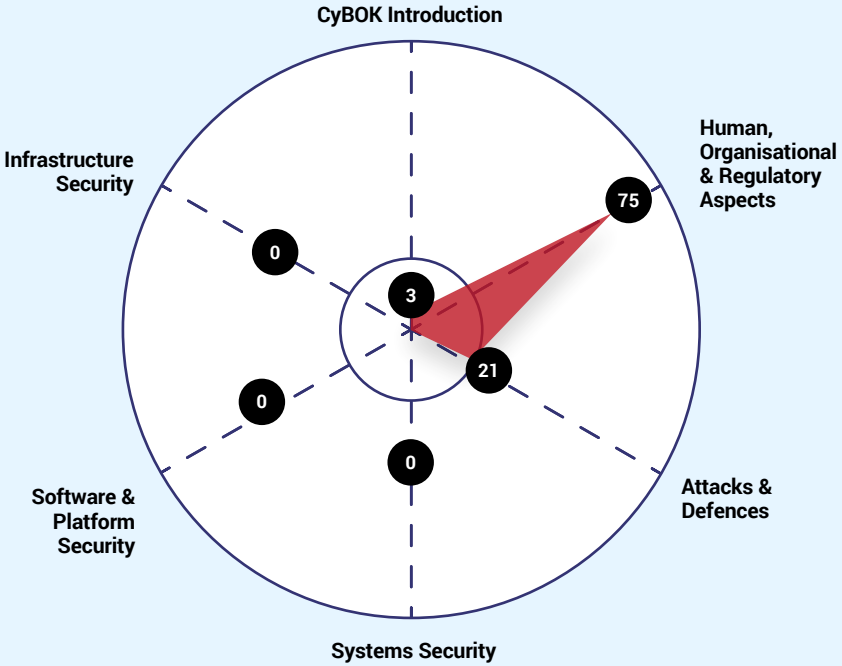


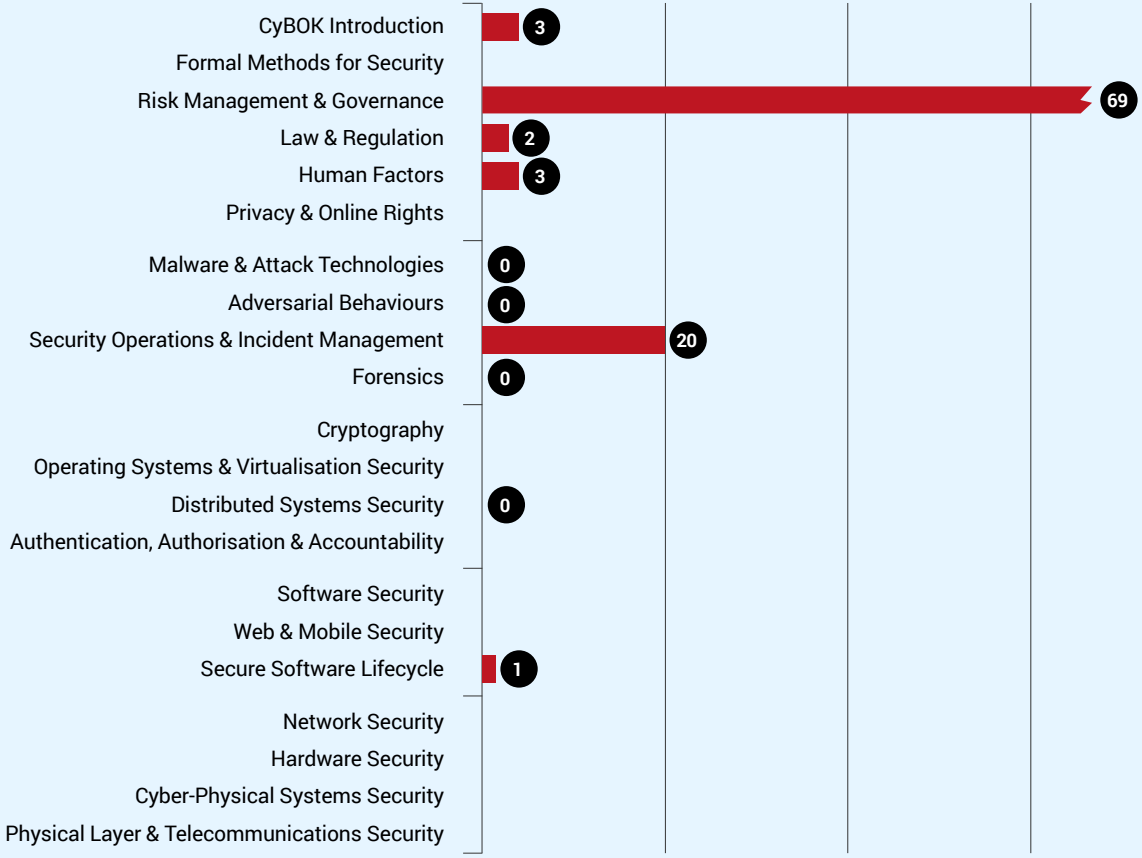
Mapped to CyBOK v1.0.0 + Formal Methods for Security

Percentage %

CISM

Certified Information Security Manager - ISACA



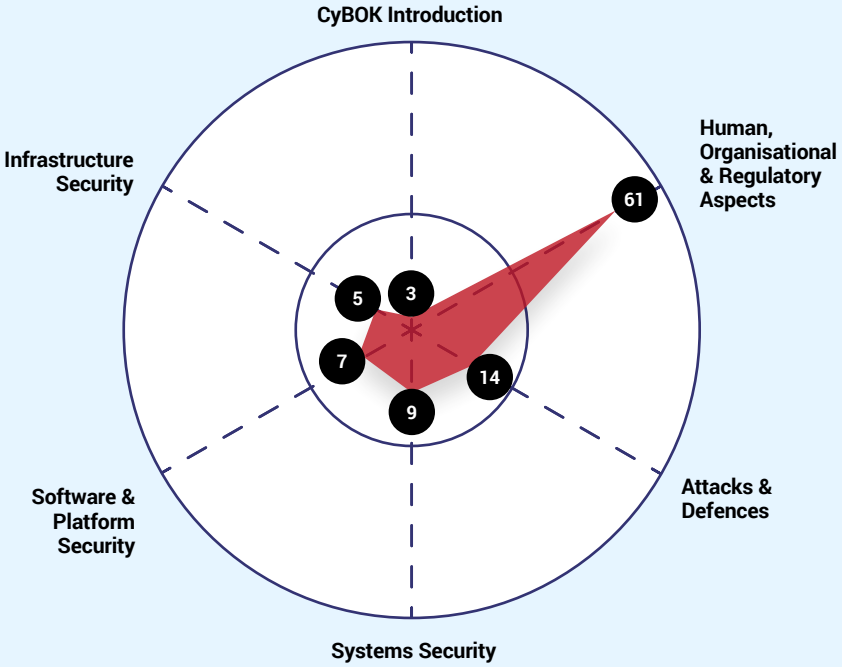


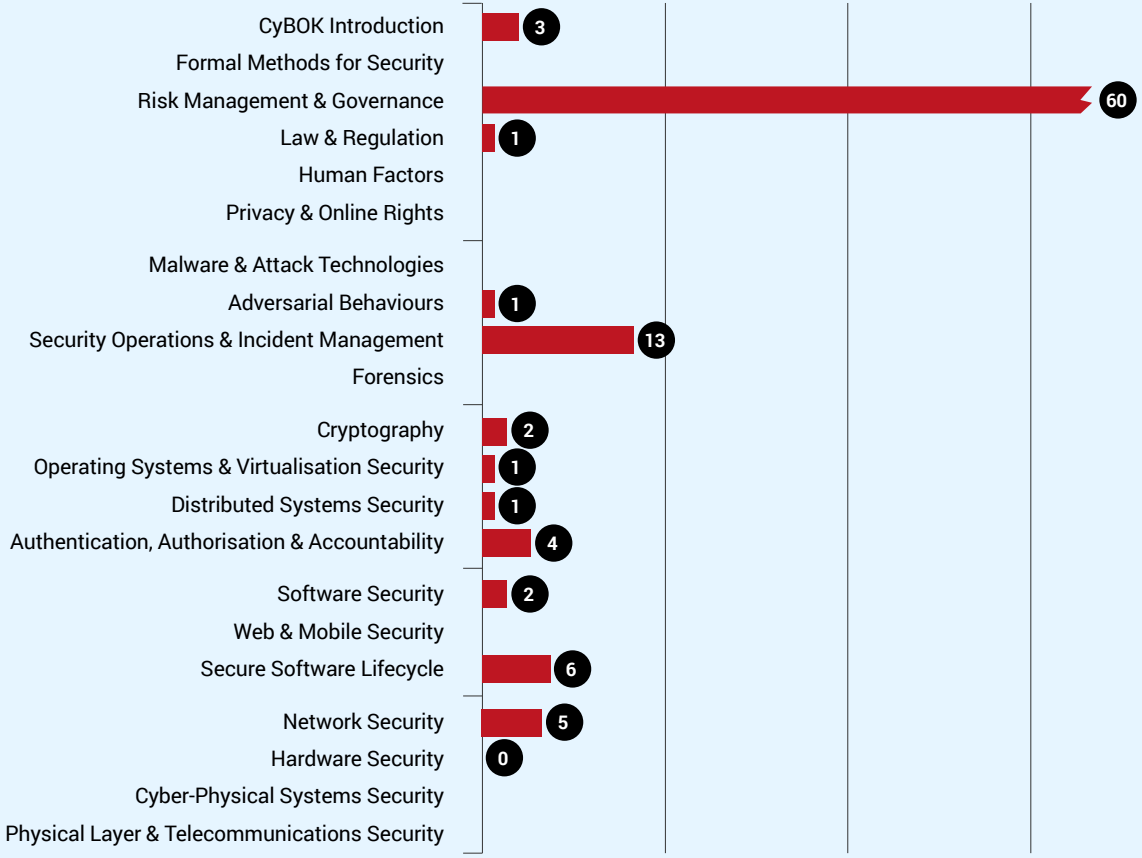
Mapped to CyBOK v1.0.0 + Formal Methods for Security

Percentage %

CRISC

Certified in Risk and Information Systems Control - ISACA



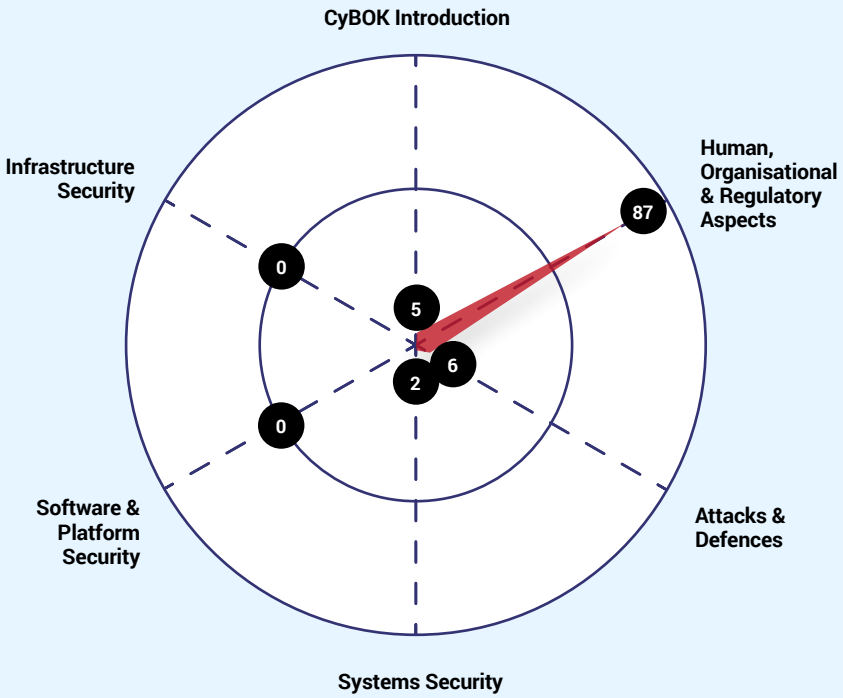


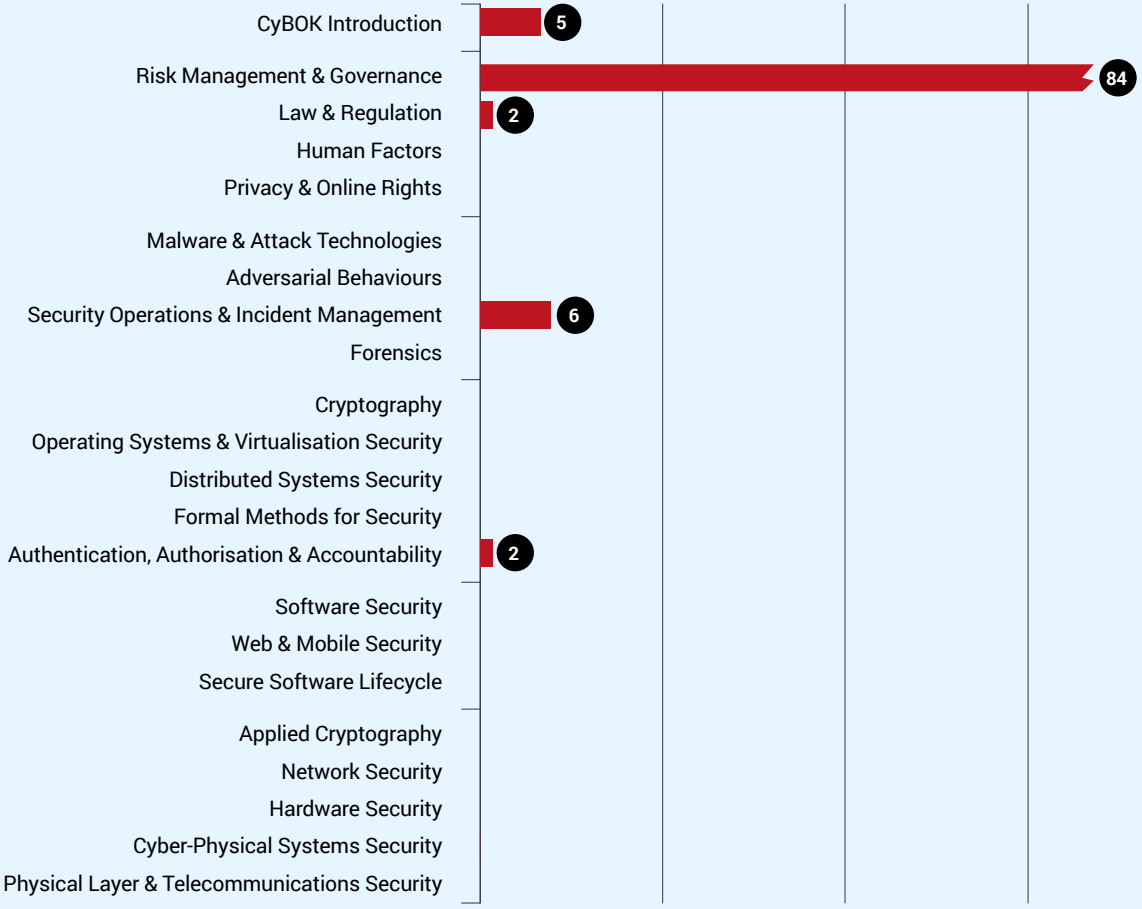
Mapped to CyBOK v1.0.0 + Formal Methods for Security

Percentage %

Practitioner Certificate in Information Risk Management

BCS



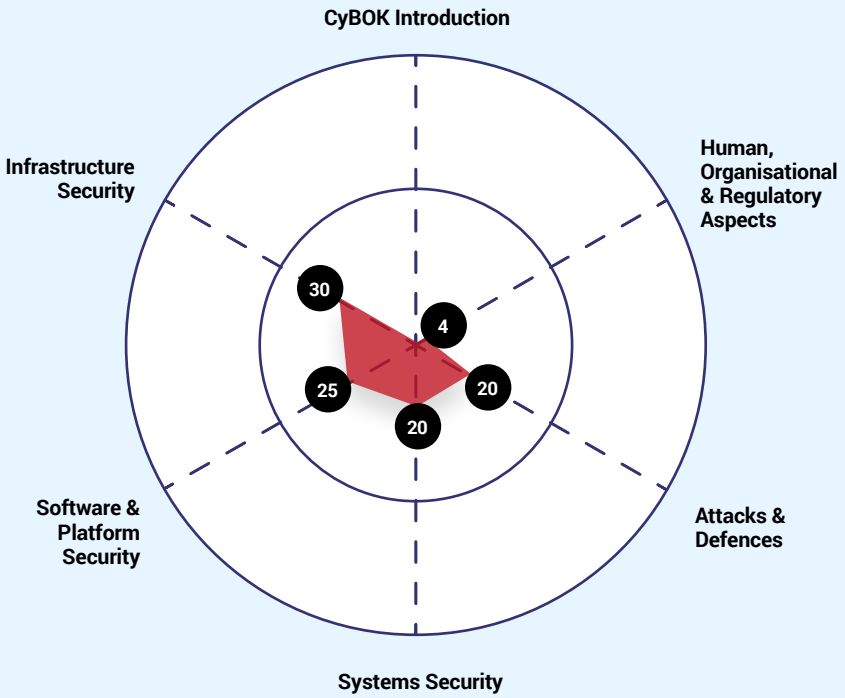


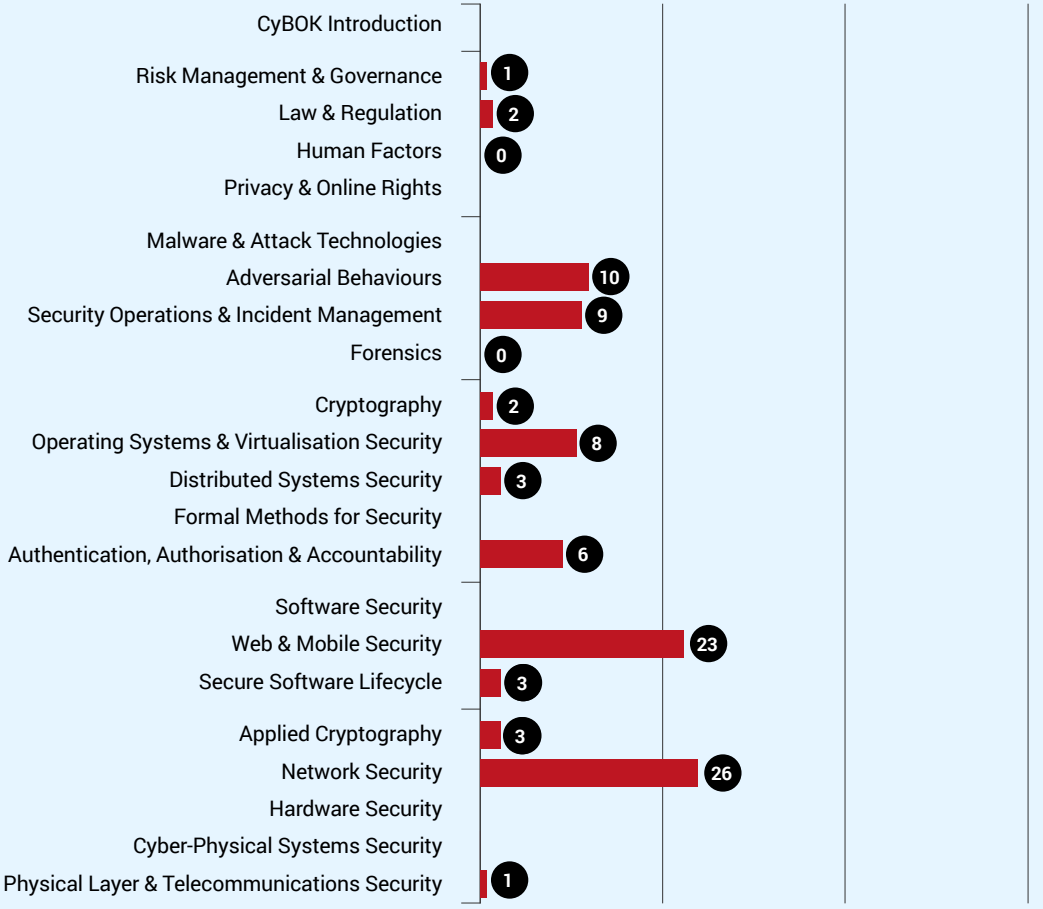
Mapped to CyBOK v1.1.0

Percentage %

CPSA

CREST Practitioner Security Analyst



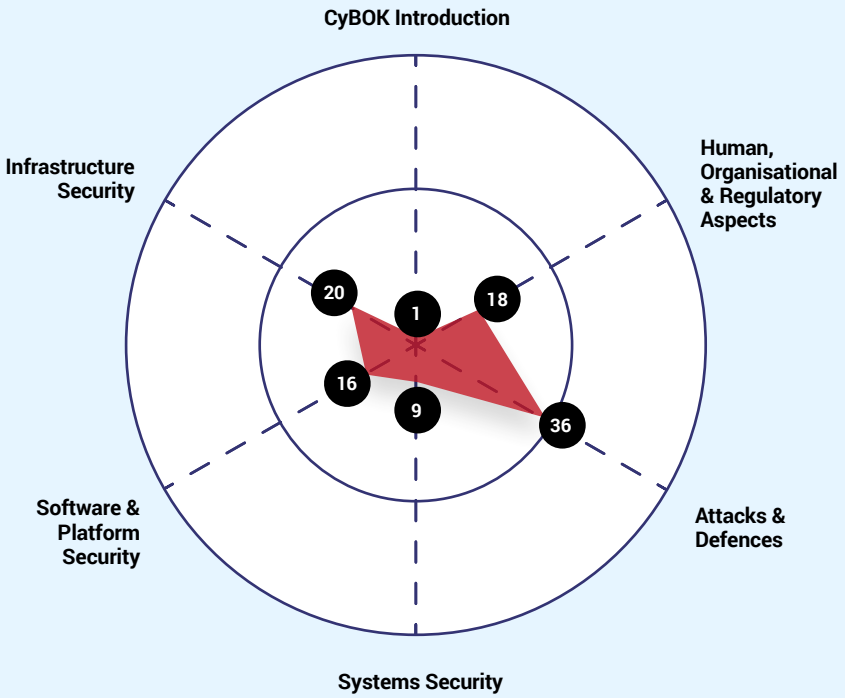


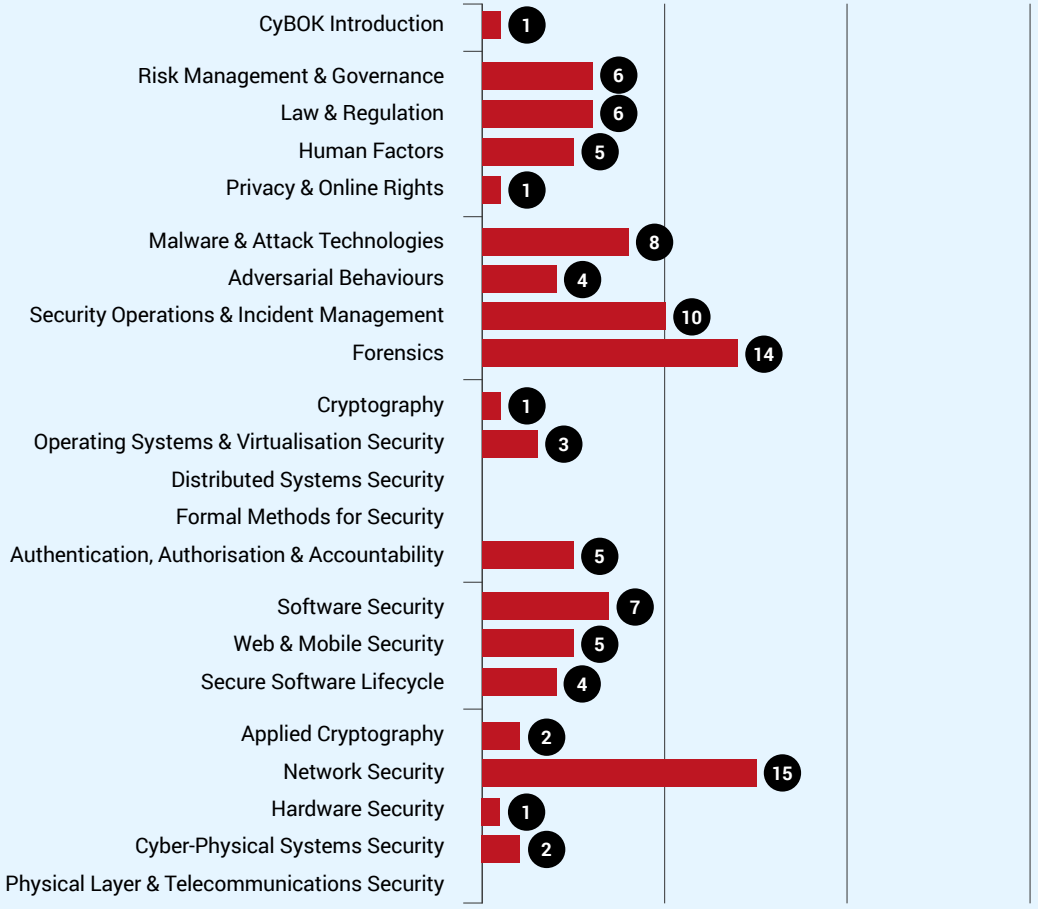
Mapped to CyBOK v1.1.0

Percentage %

Abertay University

MSc Ethical Hacking and Cyber Security





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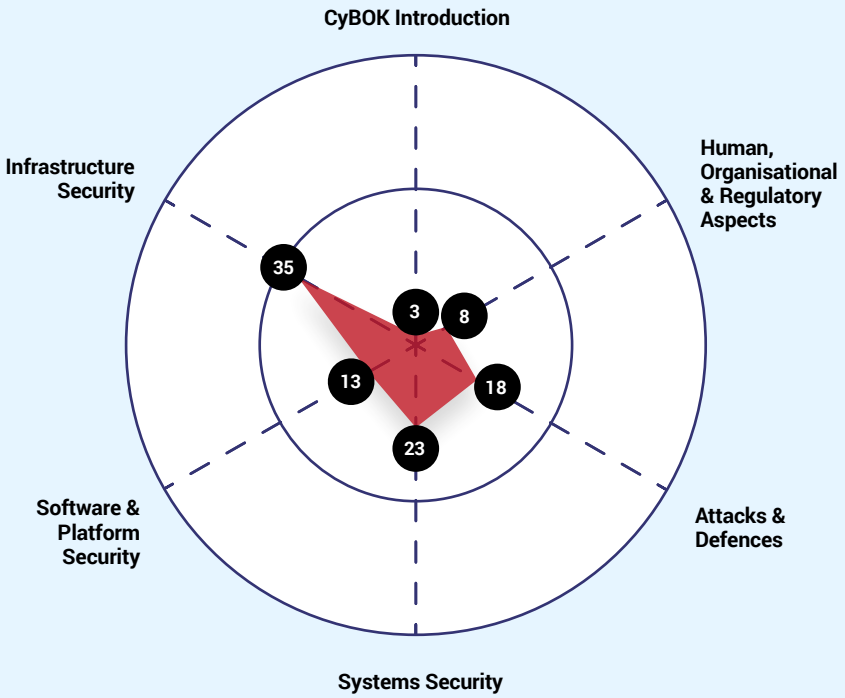
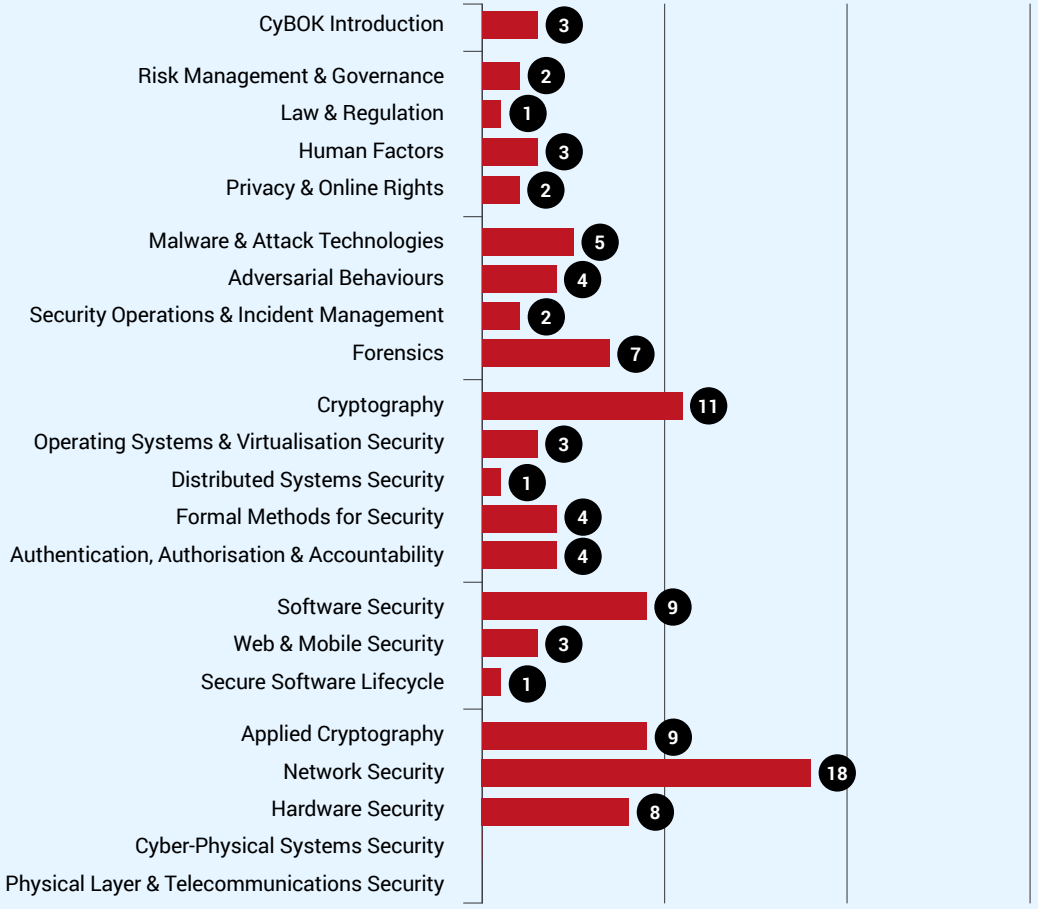
Number of credits

University of Birmingham

MSc Cyber Security





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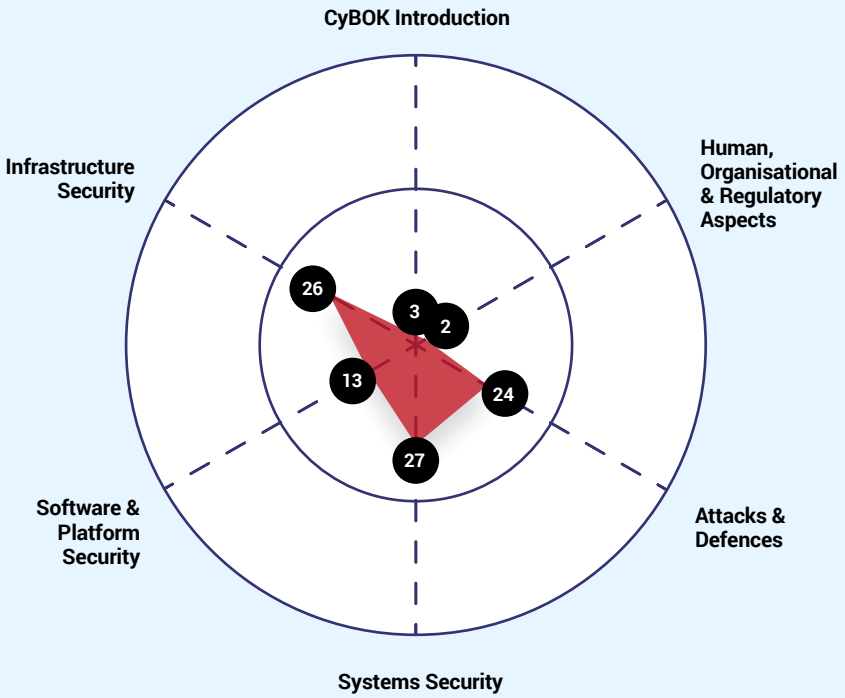
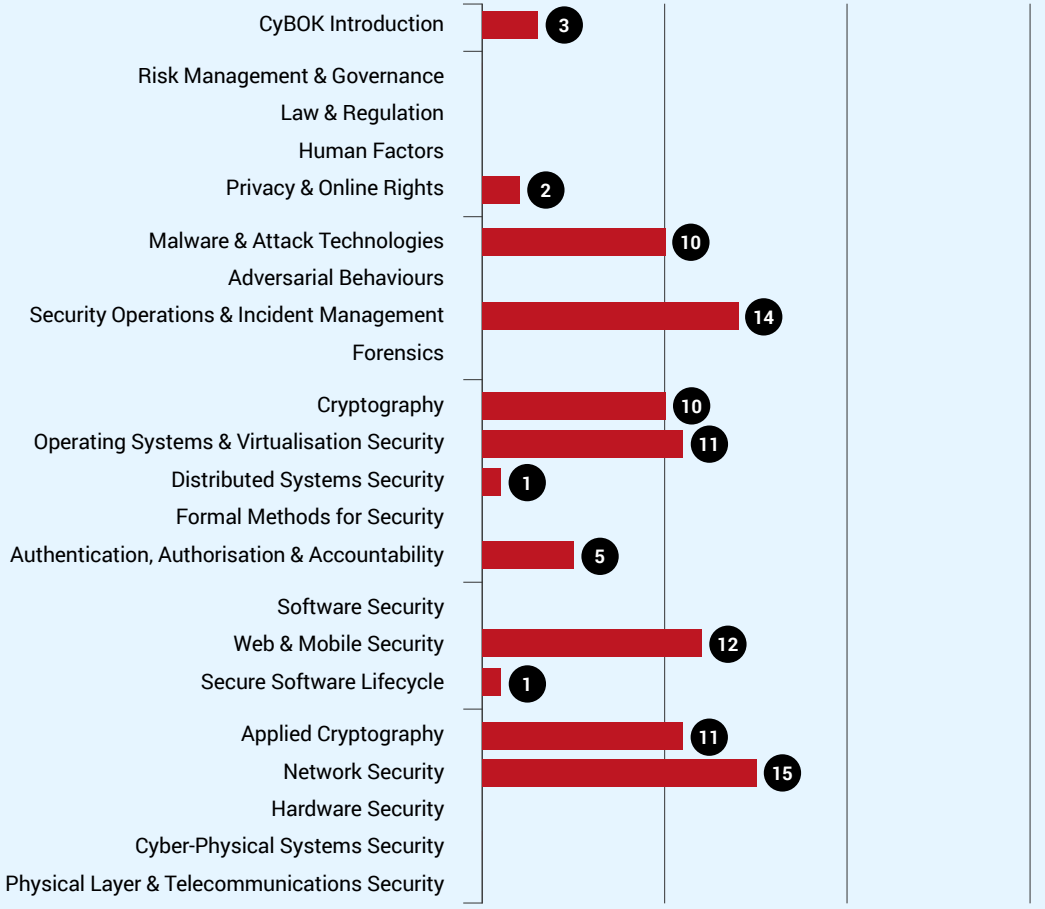
Number of credits

University of Bradford

BSc Computer Science for Cyber Security



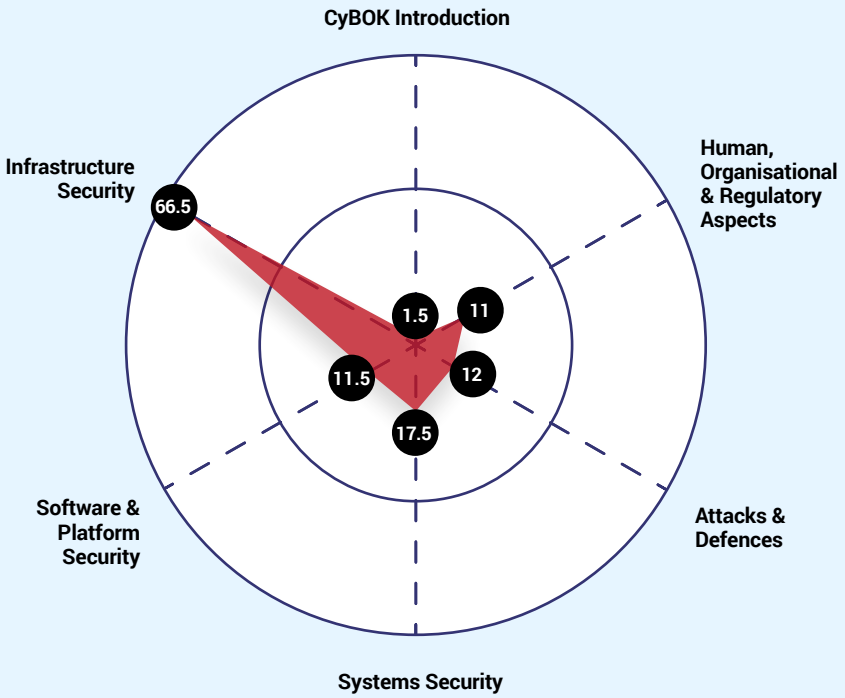


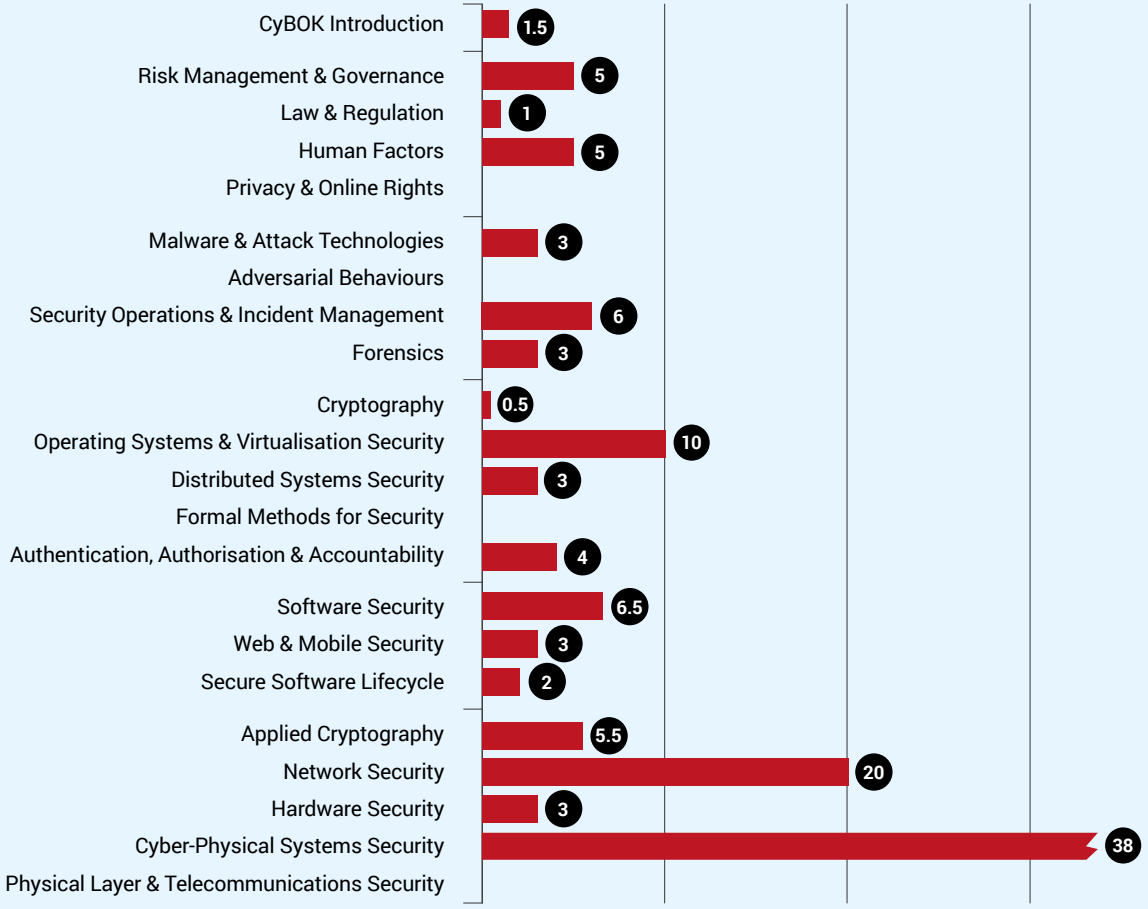
Mapped to CyBOK v1.1.0

Number of credits

University of Bristol

MSc Cyber Security (Infrastructures Security)





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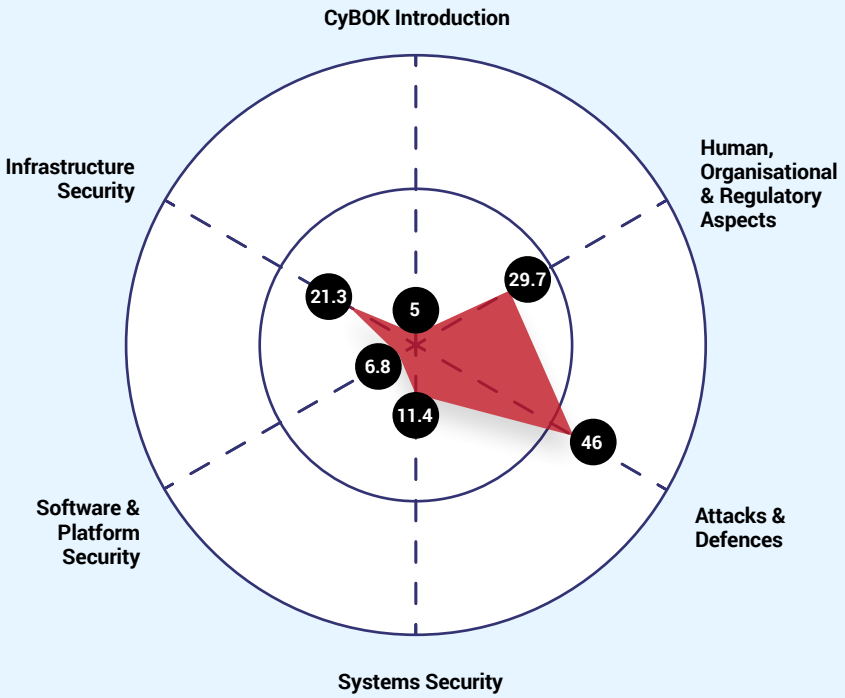
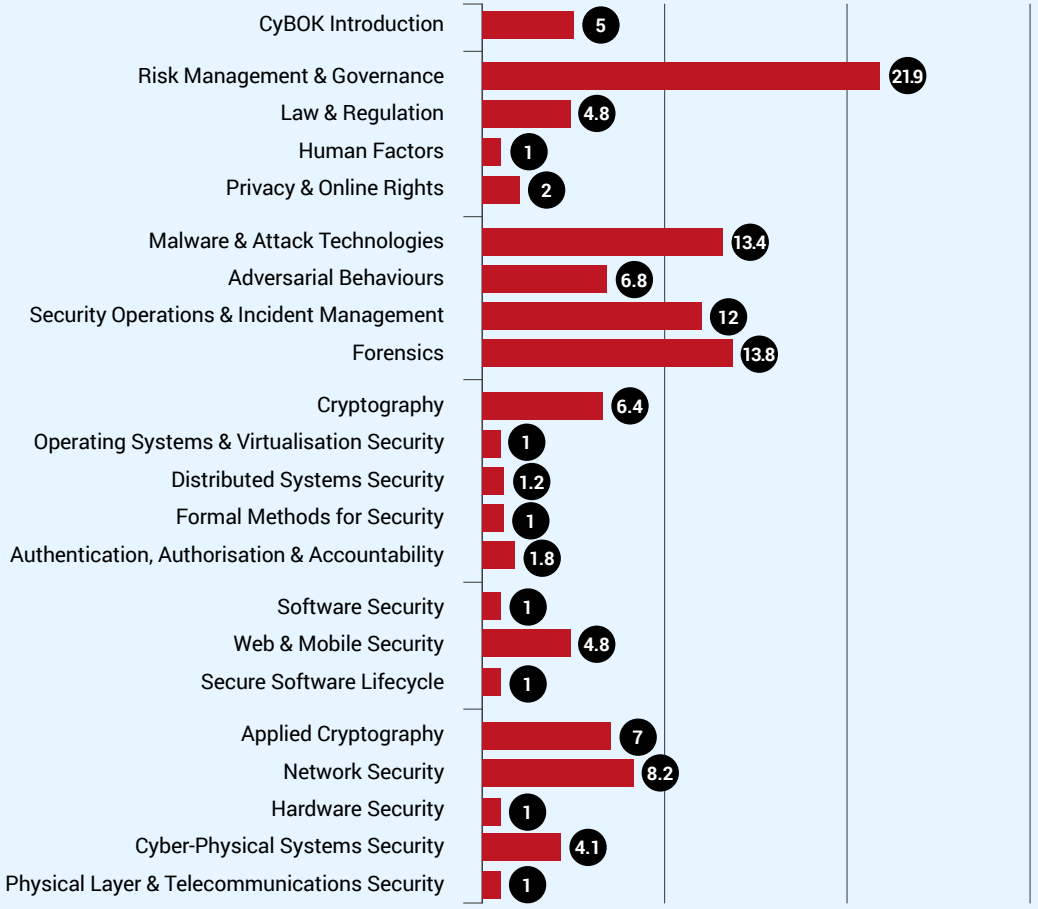
Number of credits

Cardiff University

MSc Cyber Security





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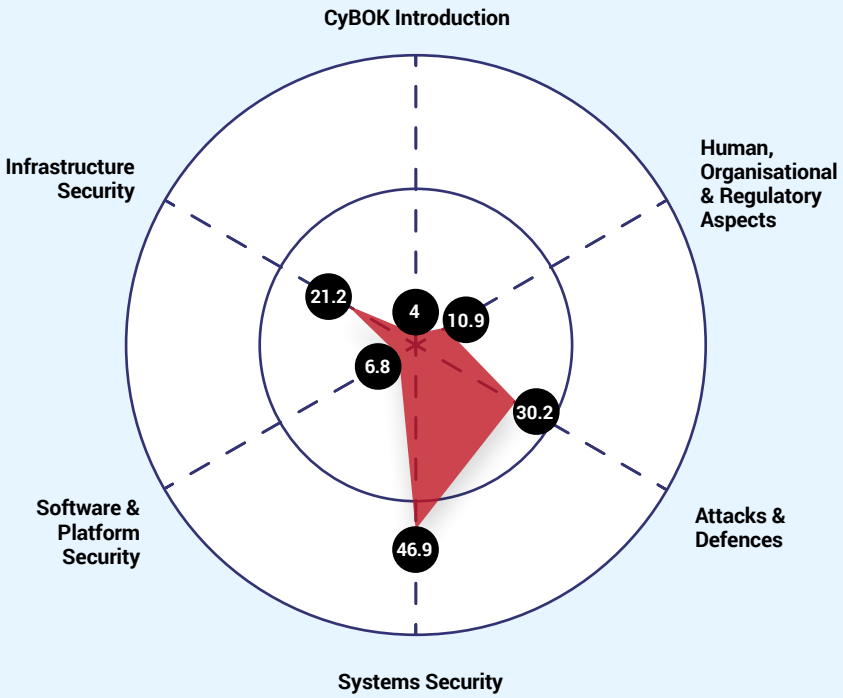
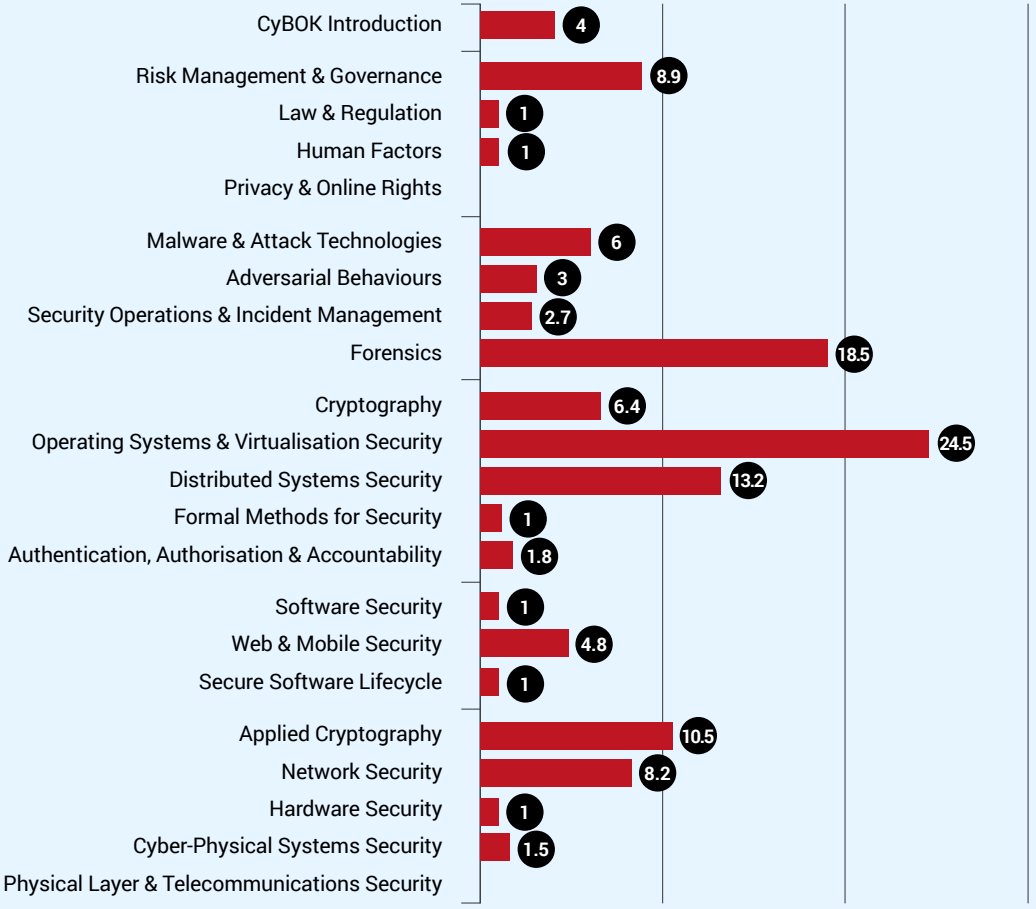
Number of credits

Cardiff University

MSc Cyber Security and Technology





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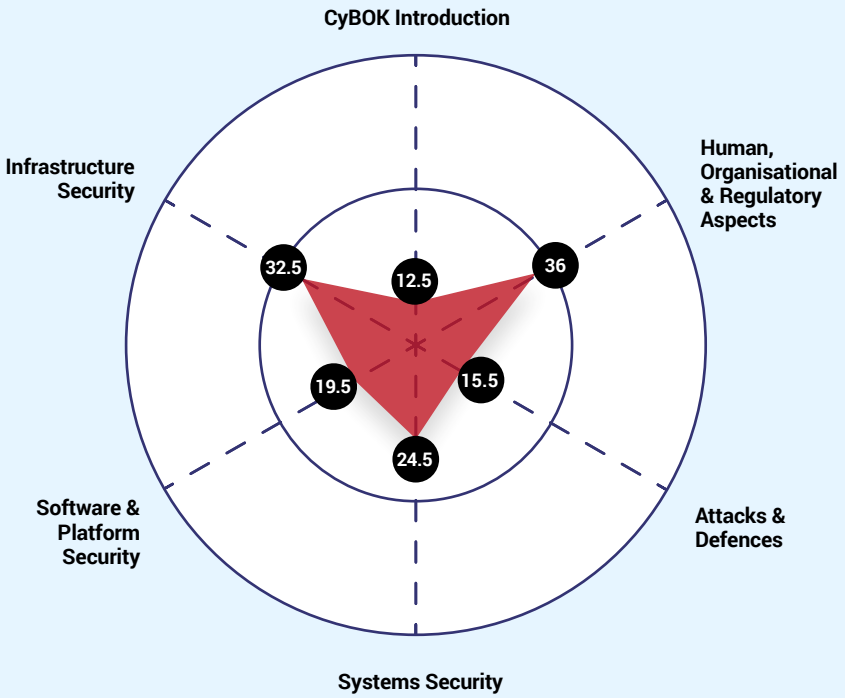
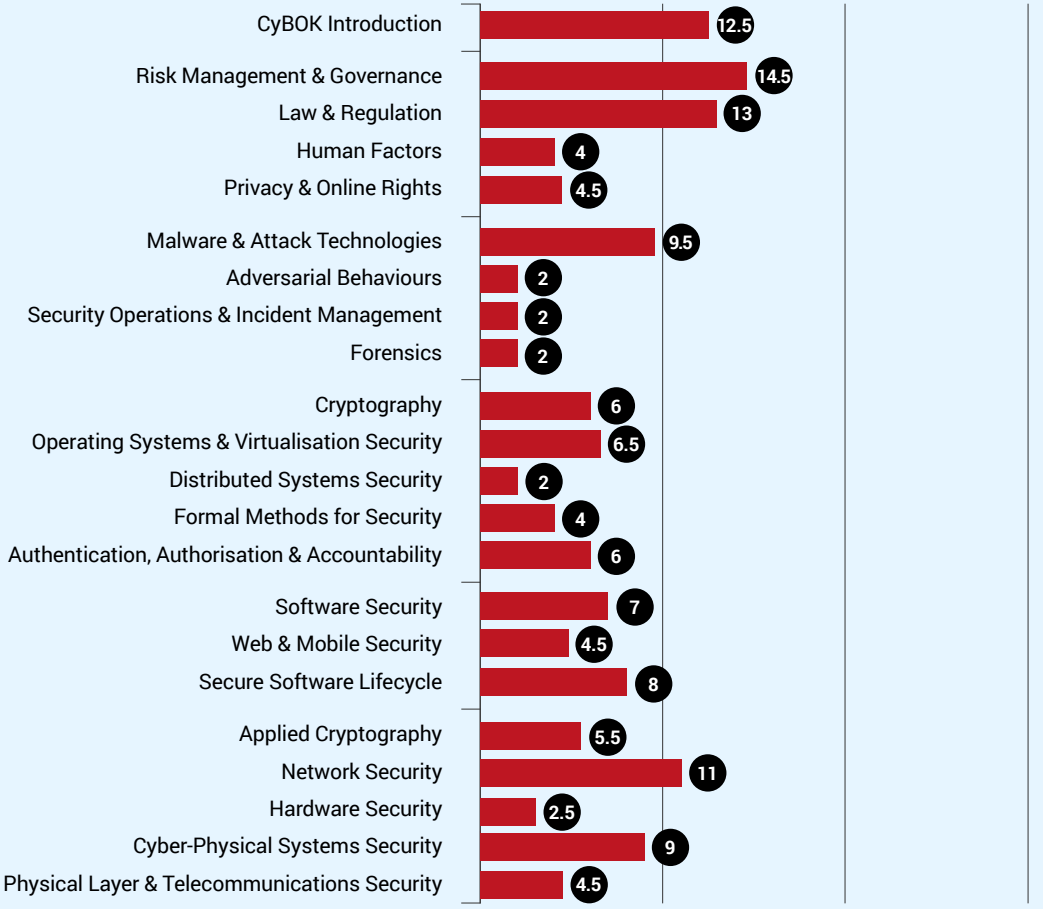
Number of credits

Cardiff Metropolitan University

BSc Computer Security



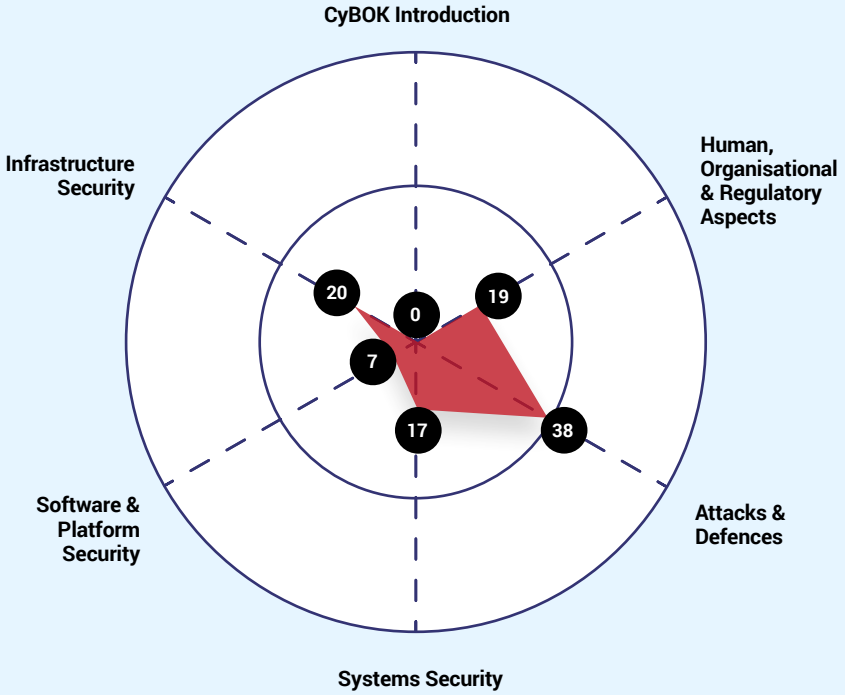


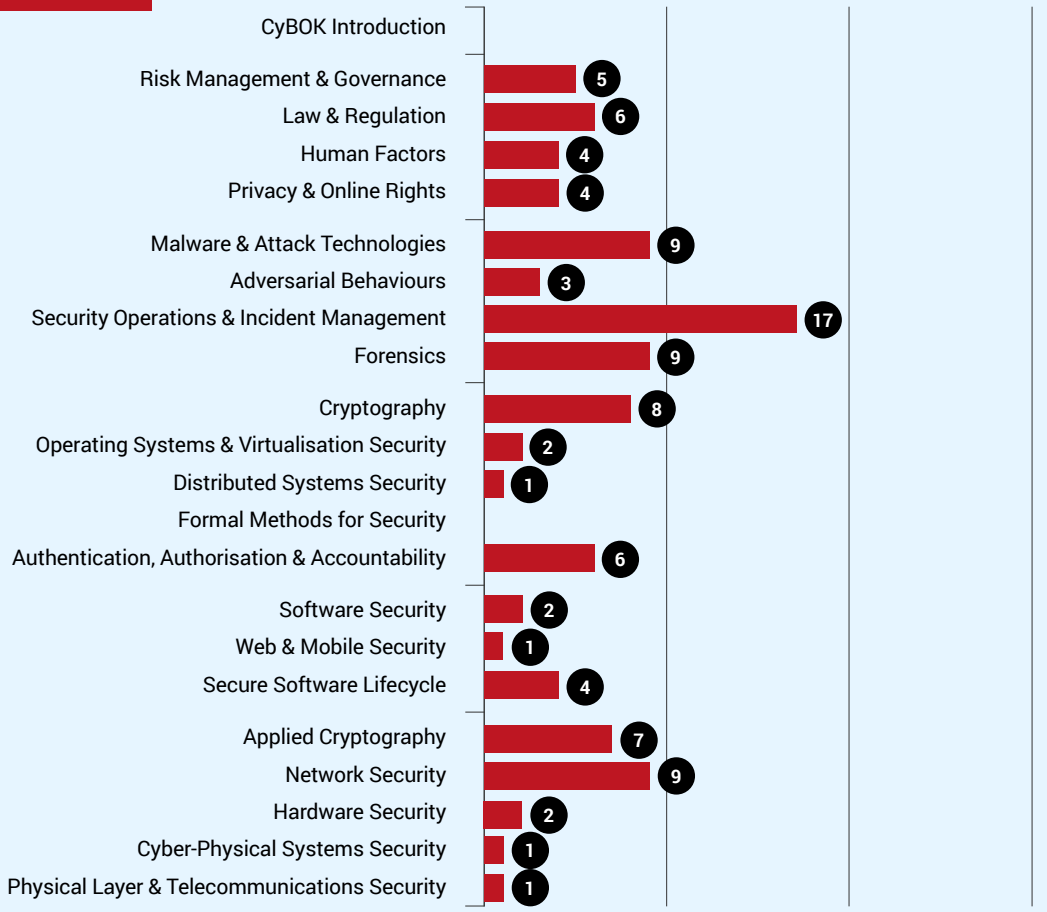
Mapped to CyBOK v1.1.0

Number of credits

City, University of London

MSc Cyber Security (Core Modules + Machine Learning Pathway)



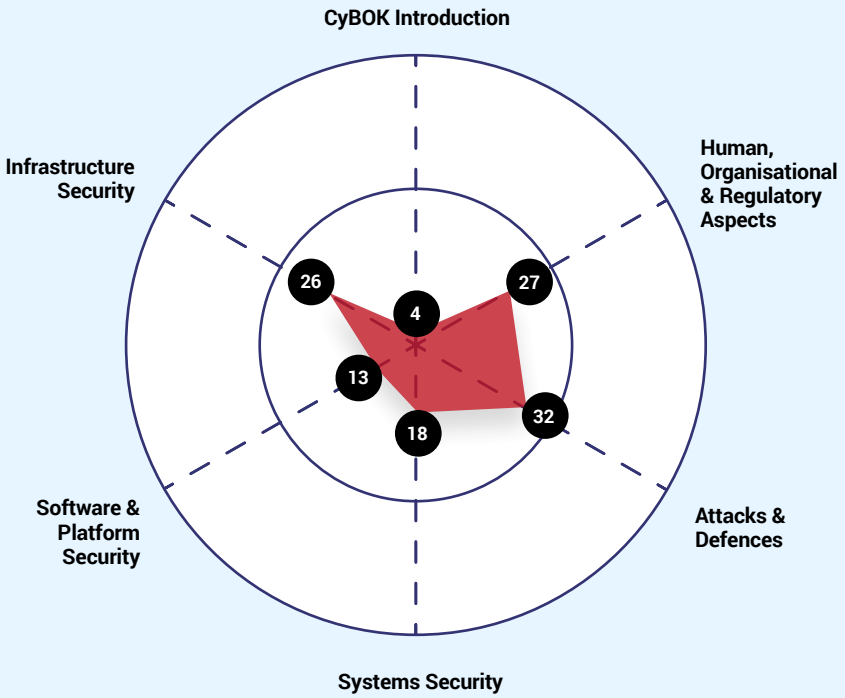


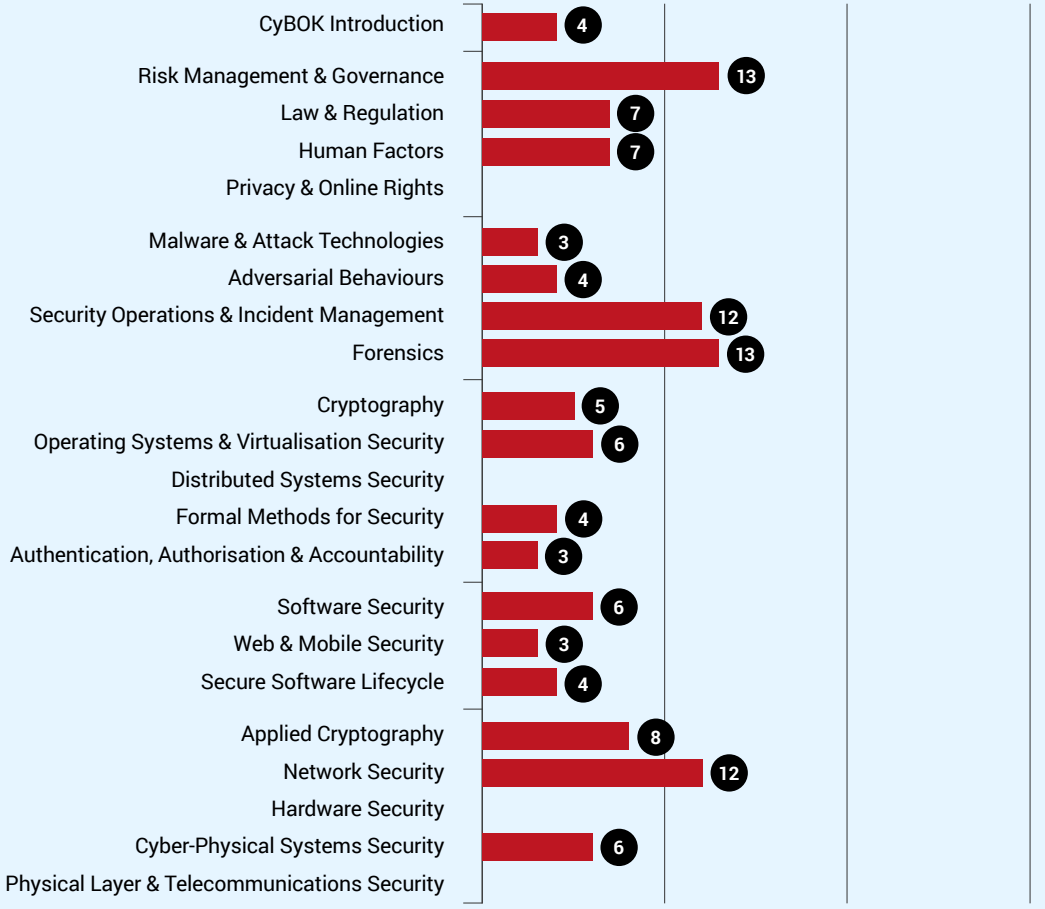
Mapped to CyBOK v1.1.0

Number of credits

Coventry University

MSc Cyber Security





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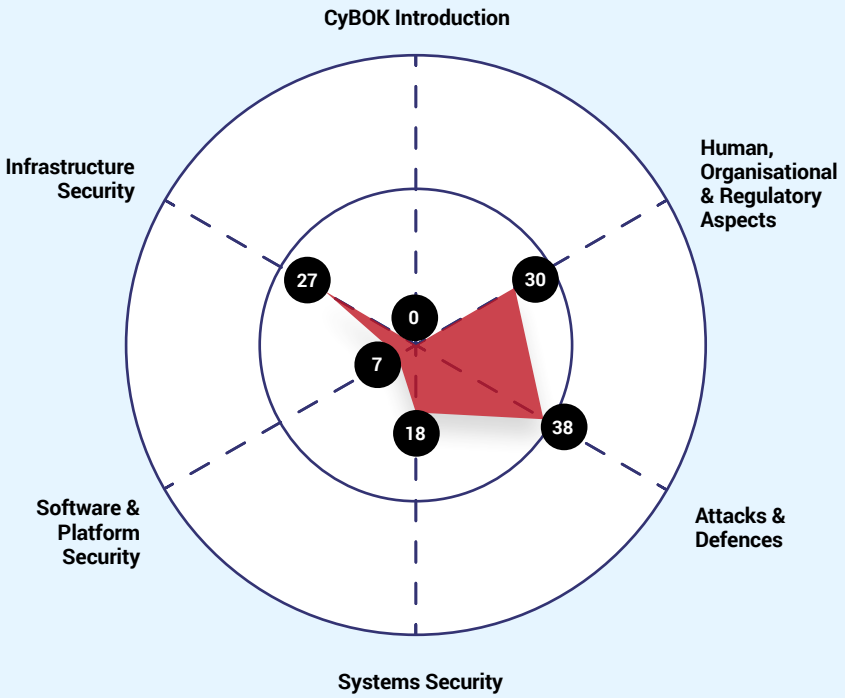
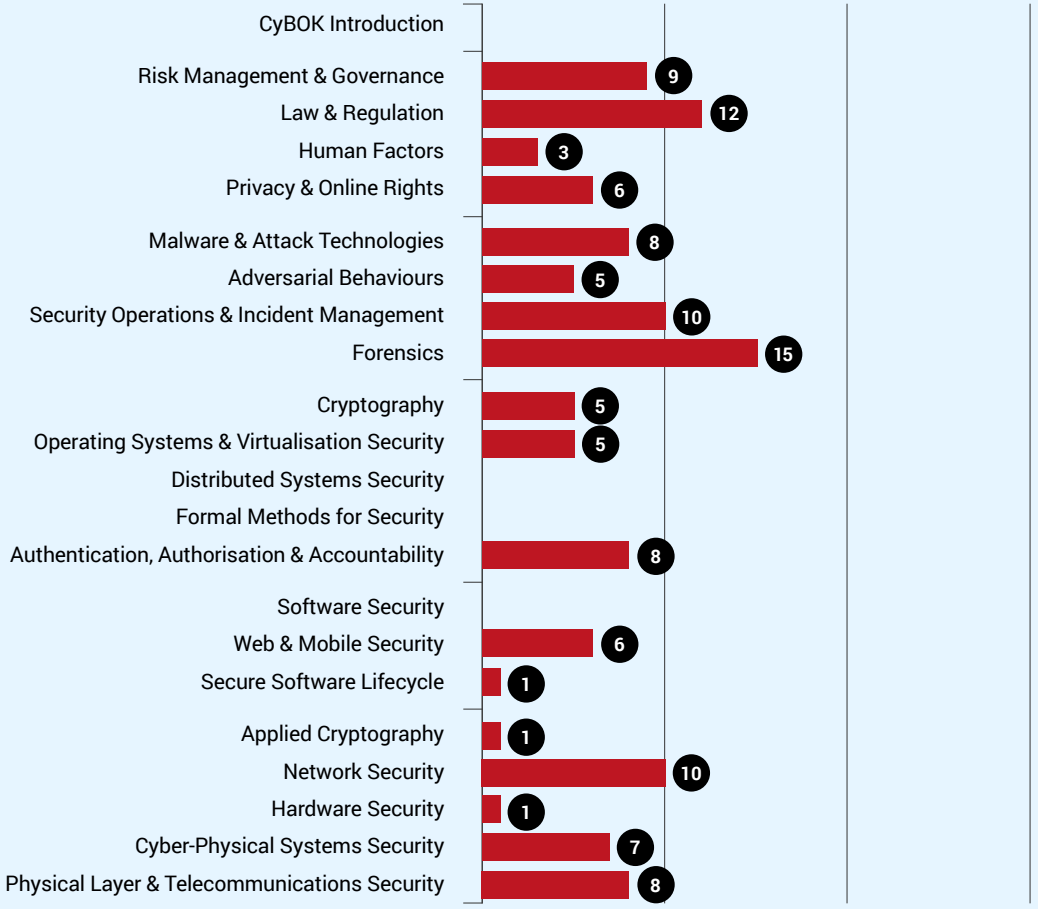
Number of credits

De Montfort University

MSc Cyber Security
MSc Cyber Technology



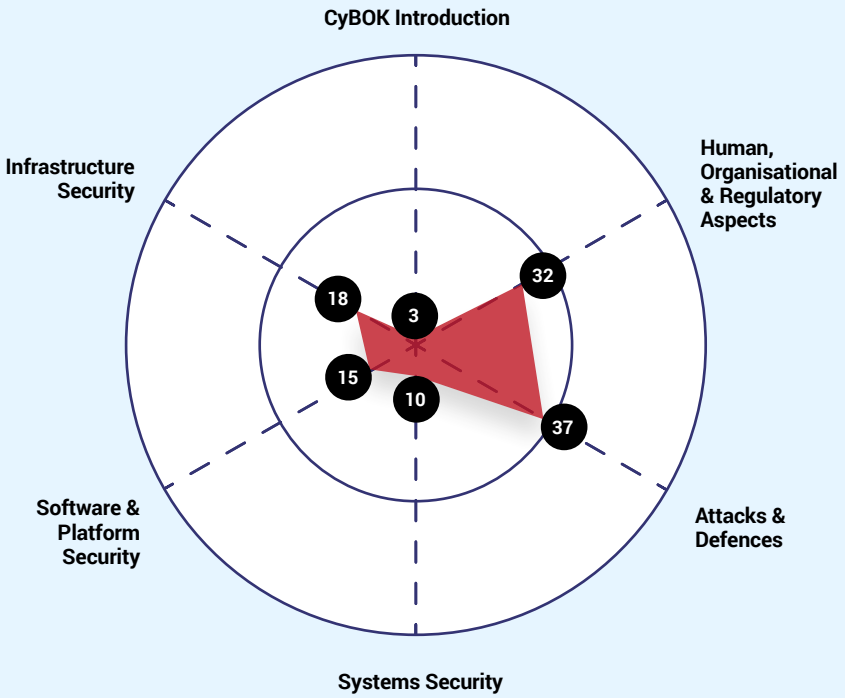


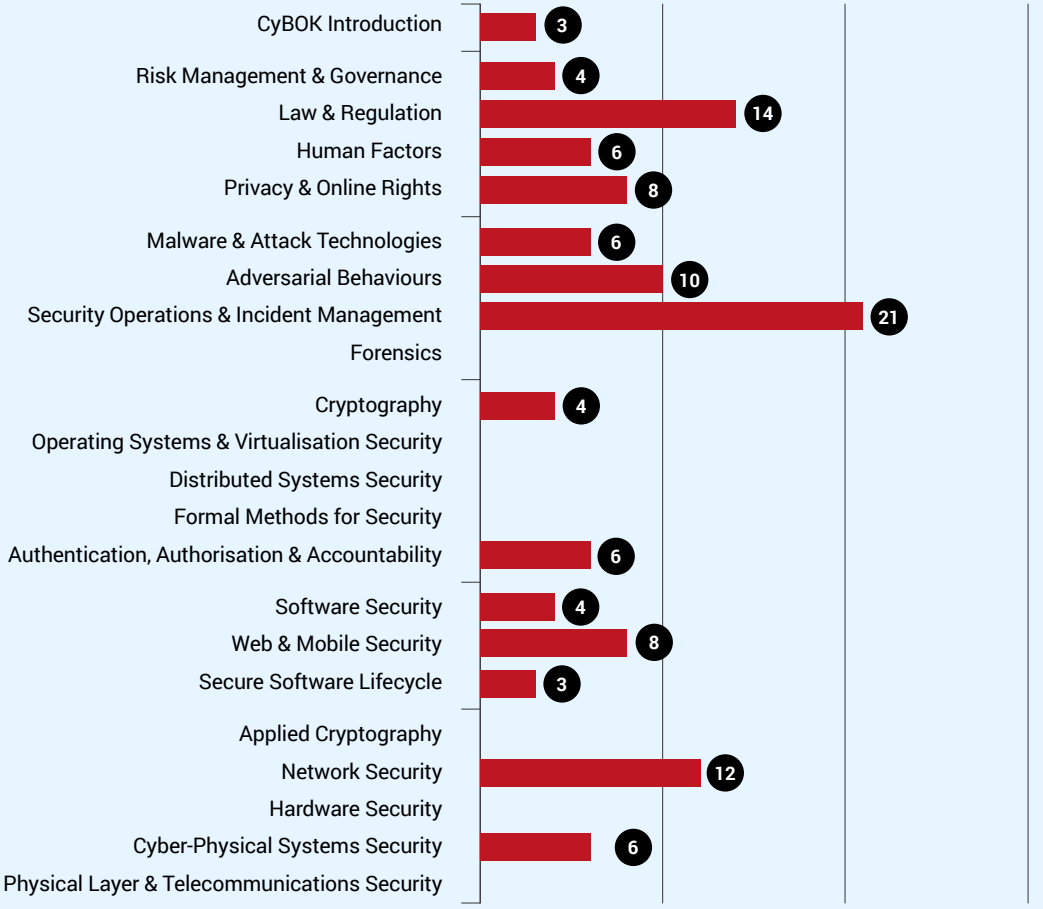
Mapped to CyBOK v1.1.0

Number of credits

University of East Anglia

MSc Cyber Security



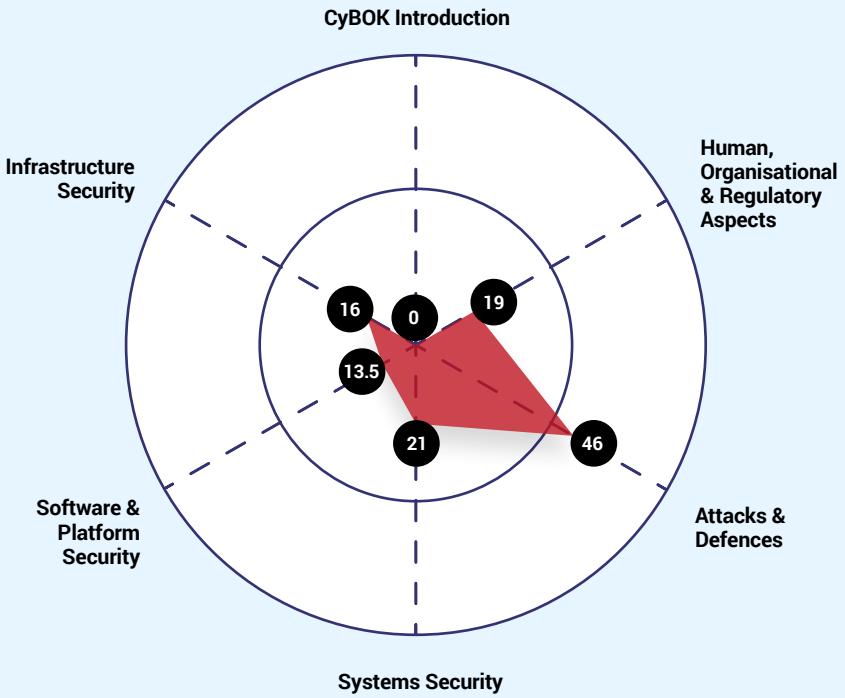


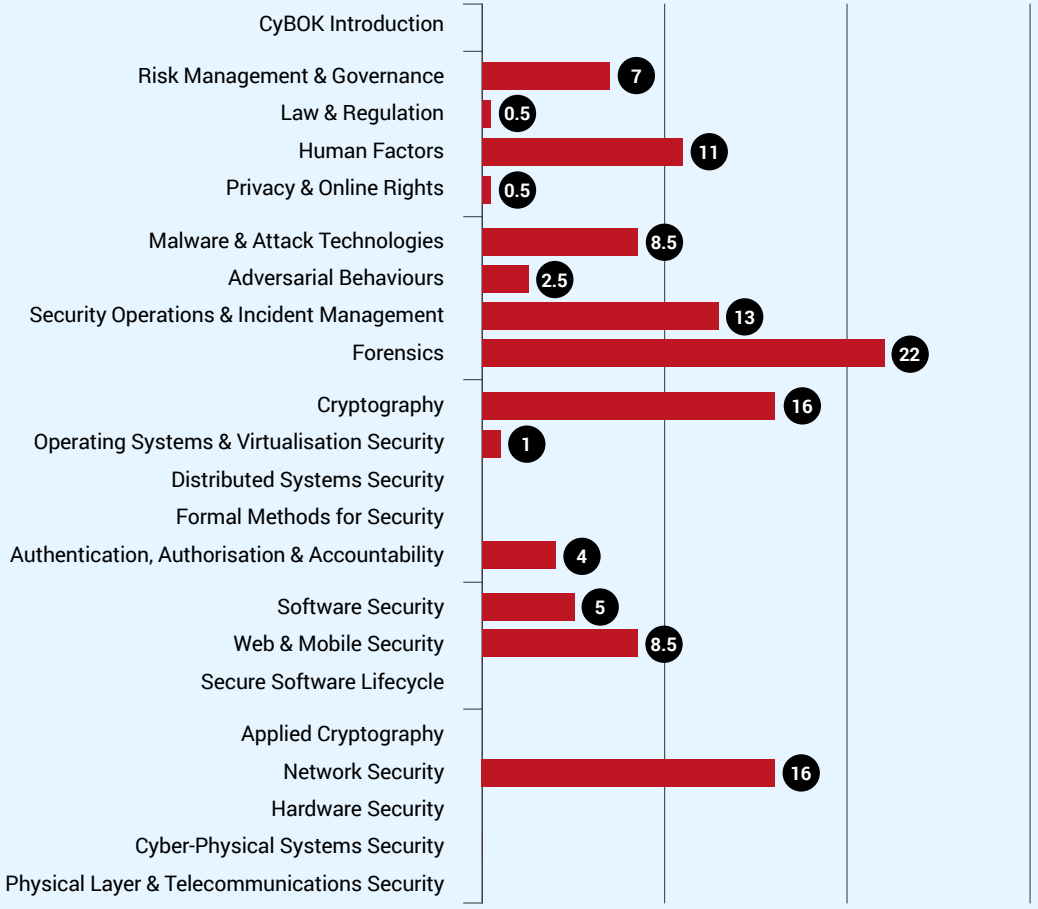
Mapped to CyBOK v1.1.0

Number of credits

Edinburgh Napier University

MSc Advanced Security and Digital Forensics



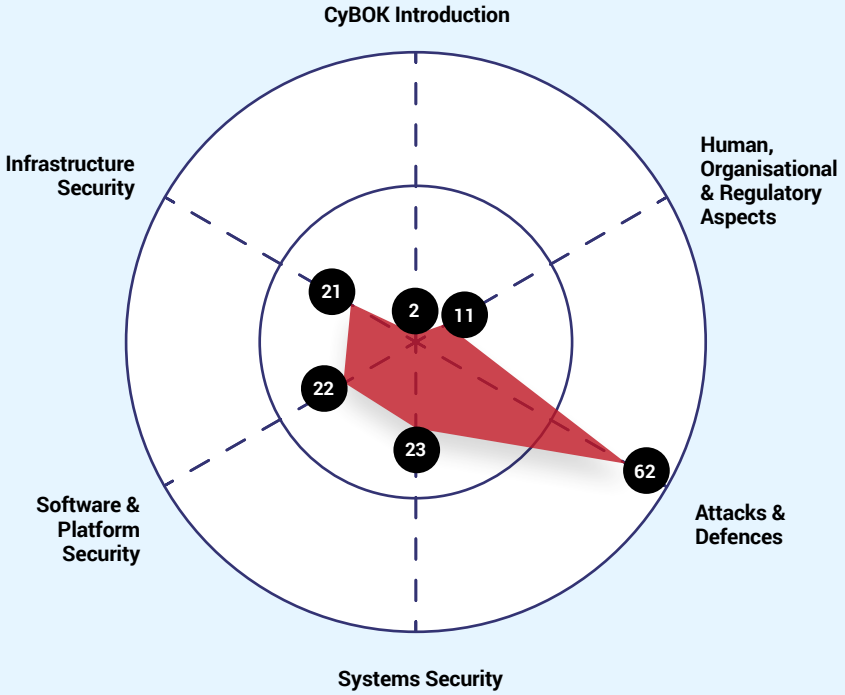


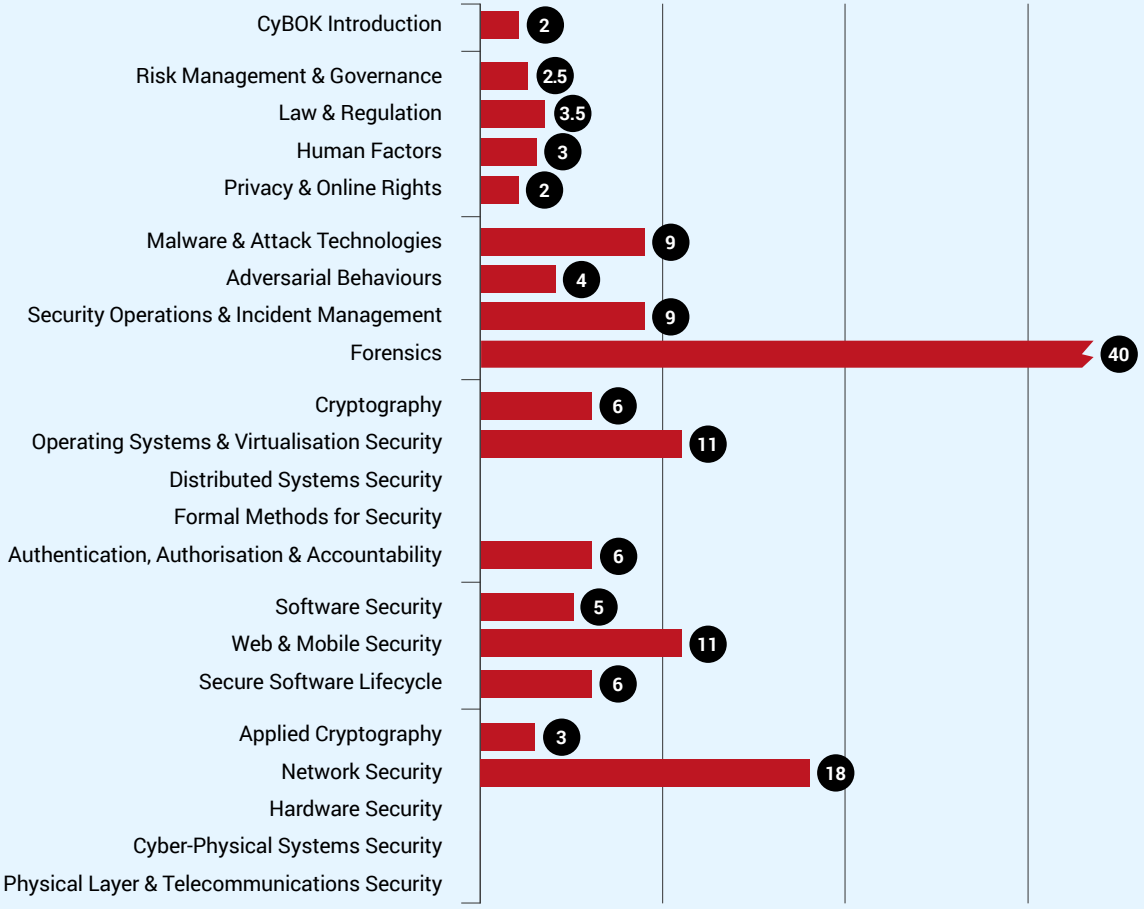
Mapped to CyBOK v1.1.0

Number of credits

Edinburgh Napier University

BEng Cyber Security and Forensics





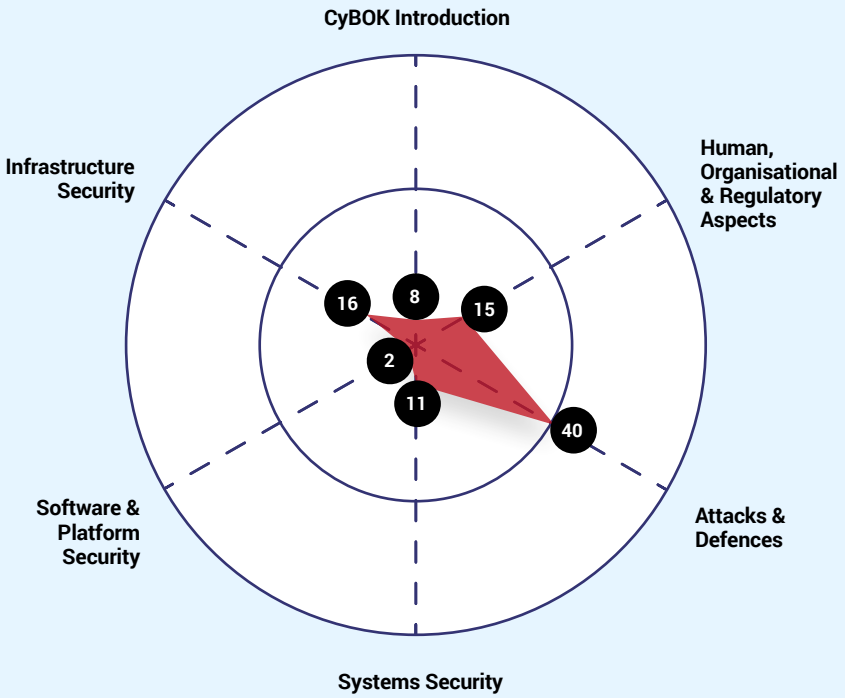
Mapped to CyBOK v1.1.0

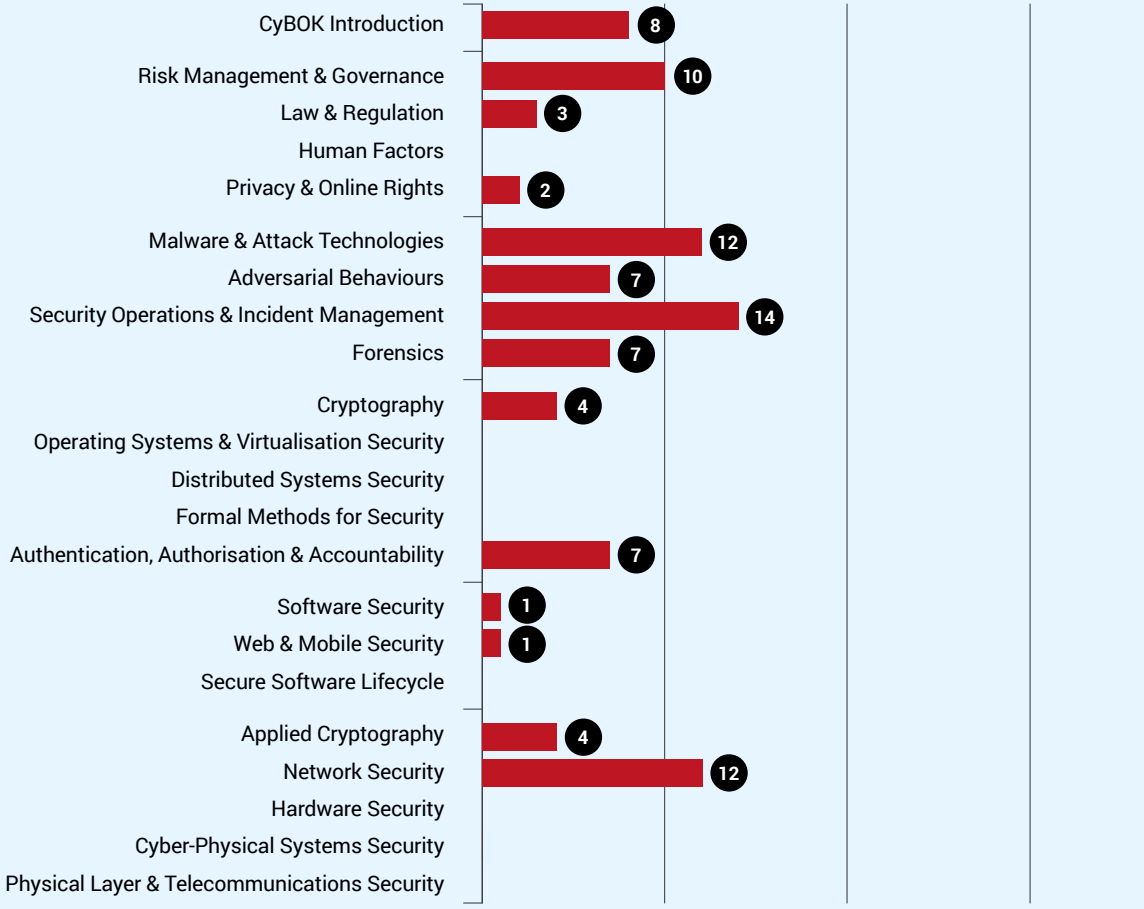
Number of credits

Glasgow Caledonian University

MSc Scottish Graduate Apprenticeship in Cyber Security
MSc Cyber Security

NCSC Certifications – Master's Degrees in Cyber Security; Scottish Graduate Apprenticeships in Cyber Security



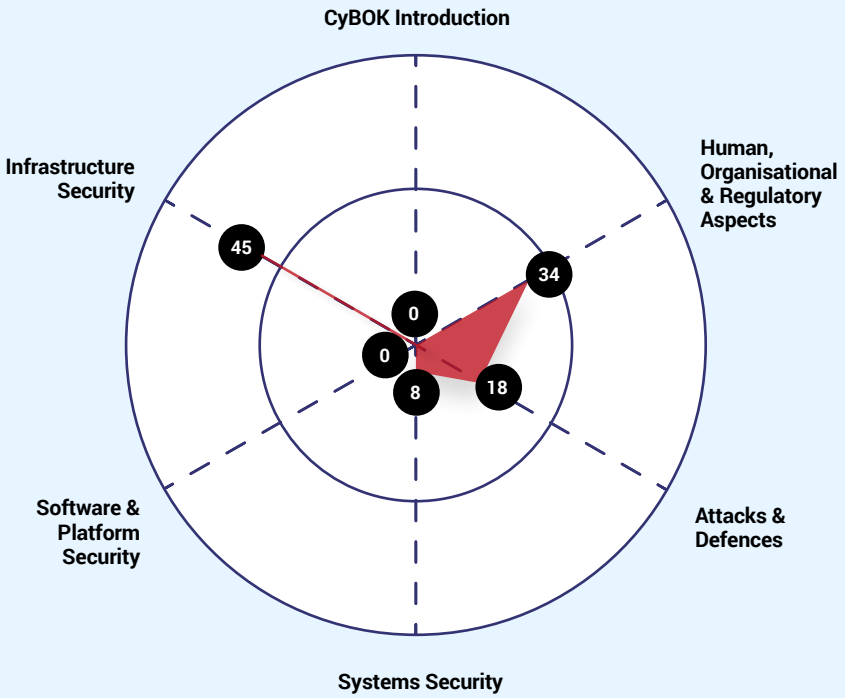


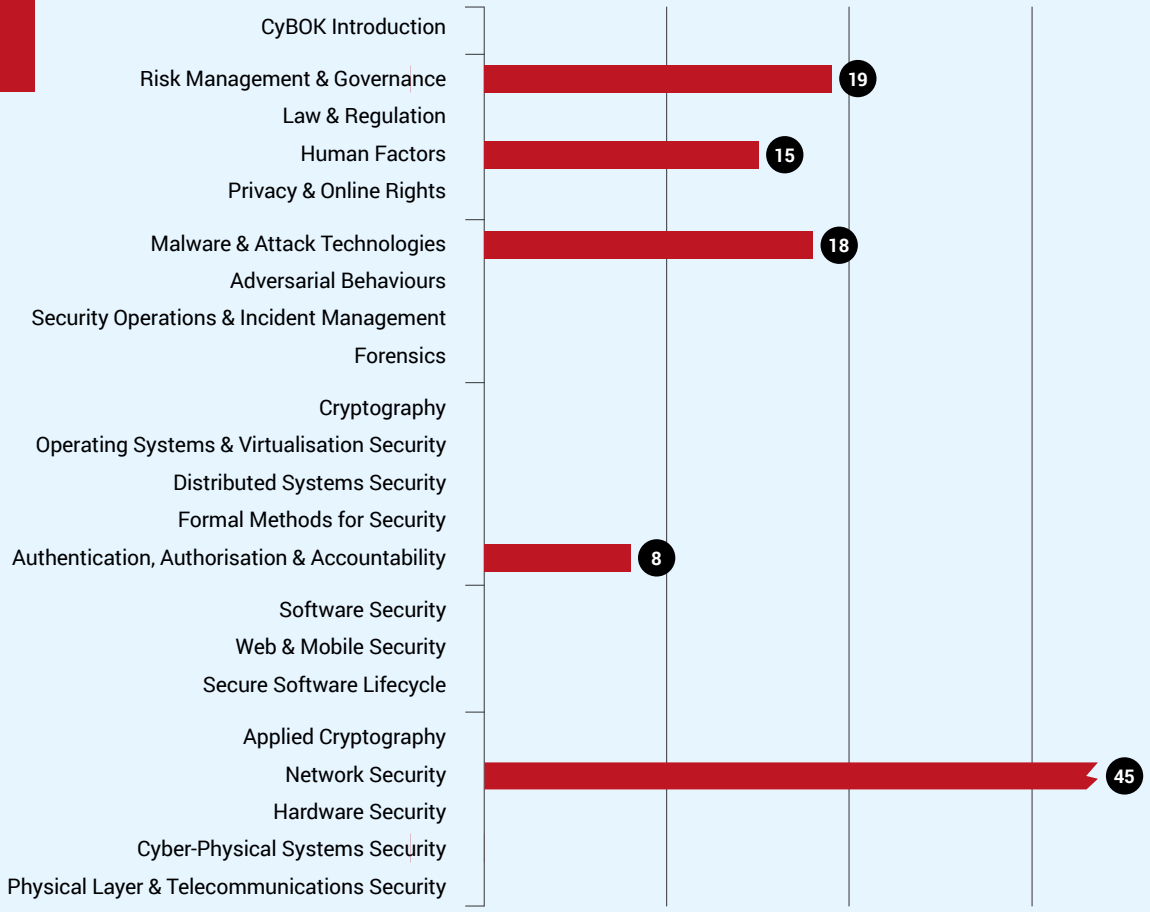
Mapped to CyBOK v1.1.0

Number of credits

University of Gloucestershire

MSc Cyber Security (Cyber Networking Specialist Pathway)



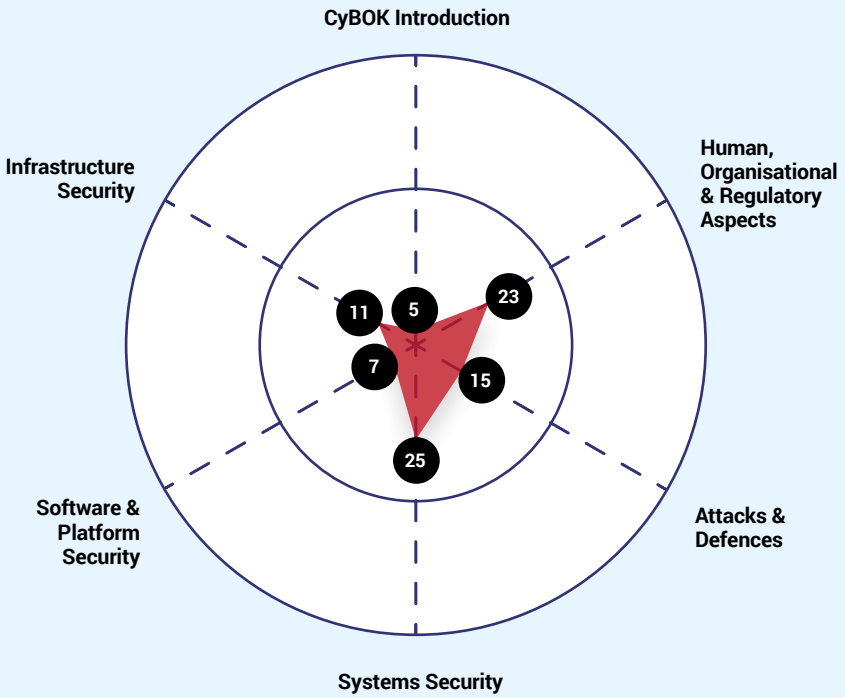


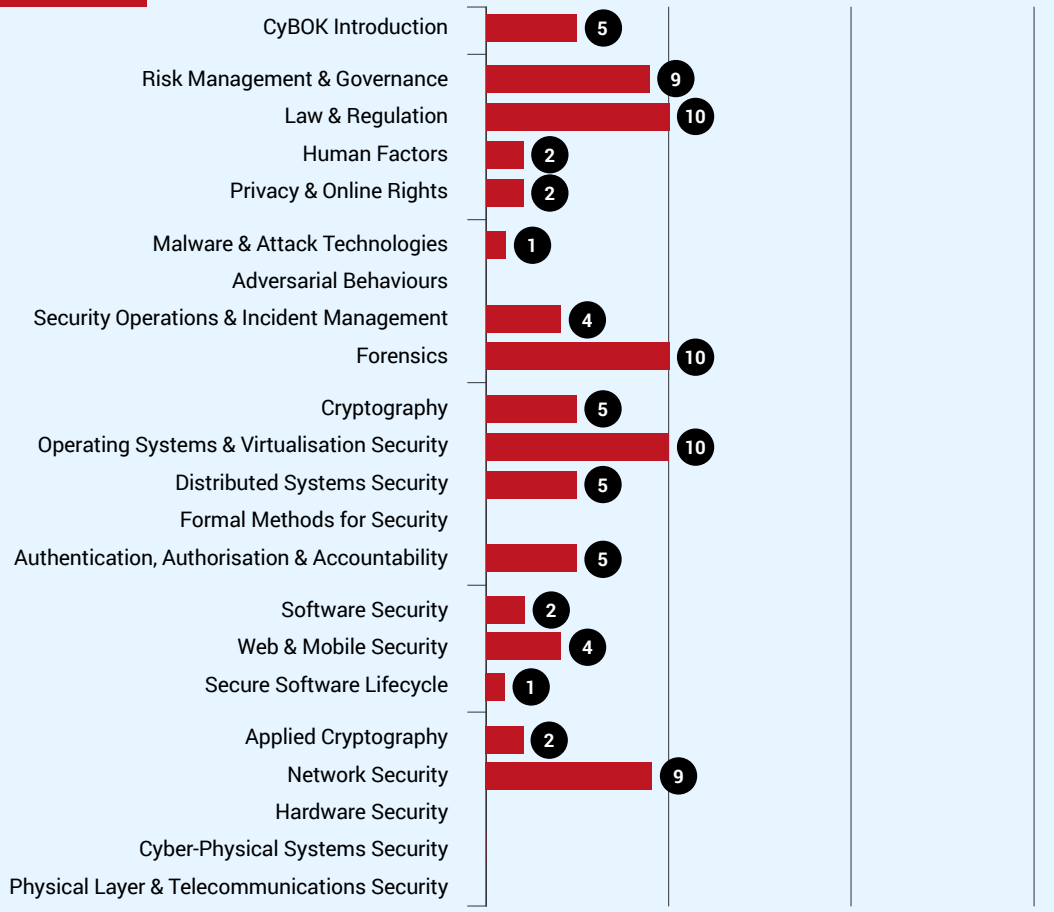
Mapped to CyBOK v1.1.0

Number of credits

University of Greenwich

MSc Computer Forensics and Cyber Security (One of Three Available Pathways)



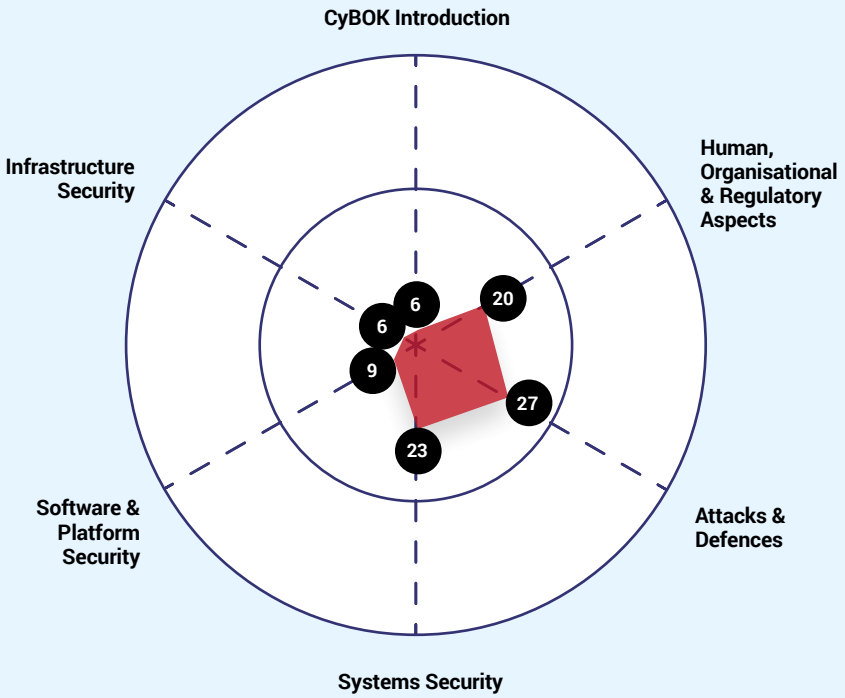


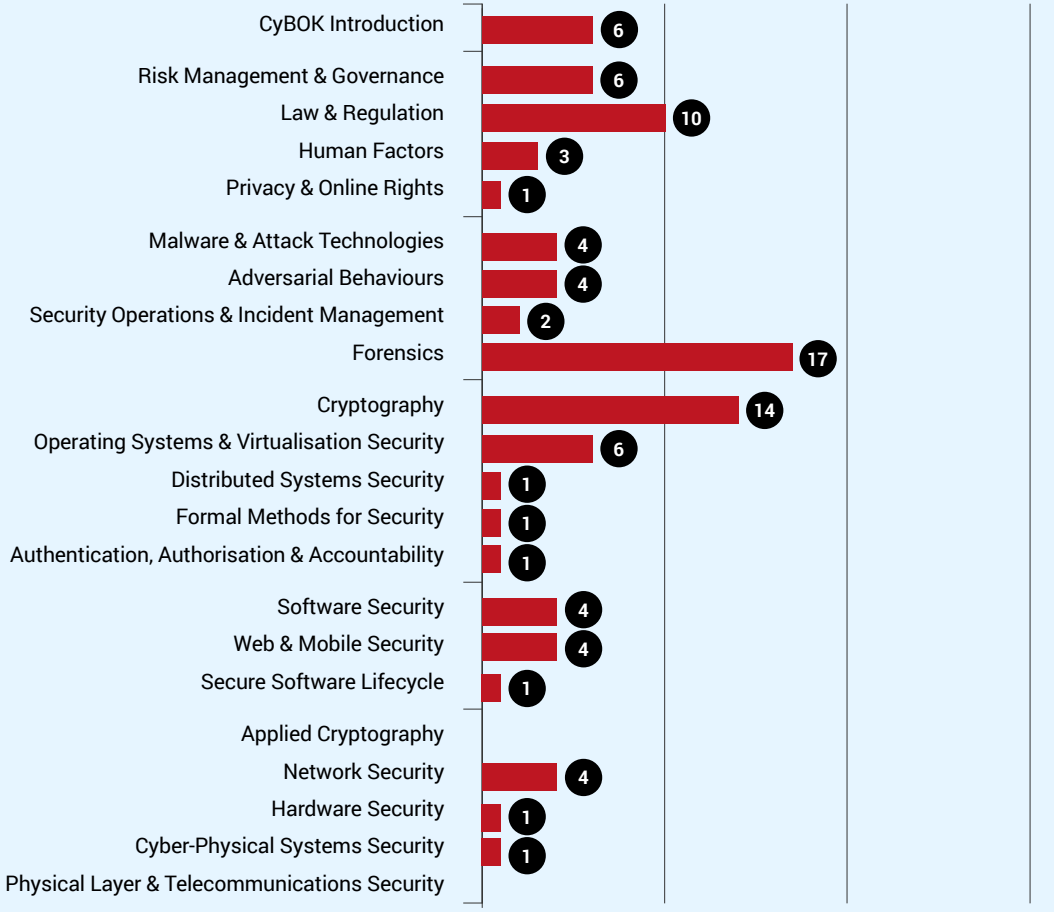
Mapped to CyBOK v1.1.0

Number of credits

University of Greenwich

BSc Computer Security and Forensics





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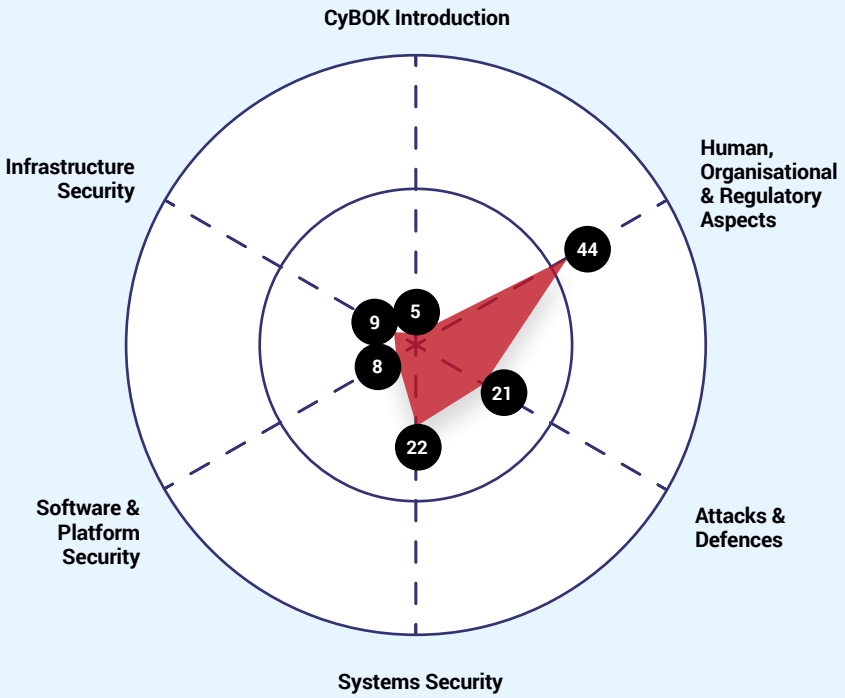
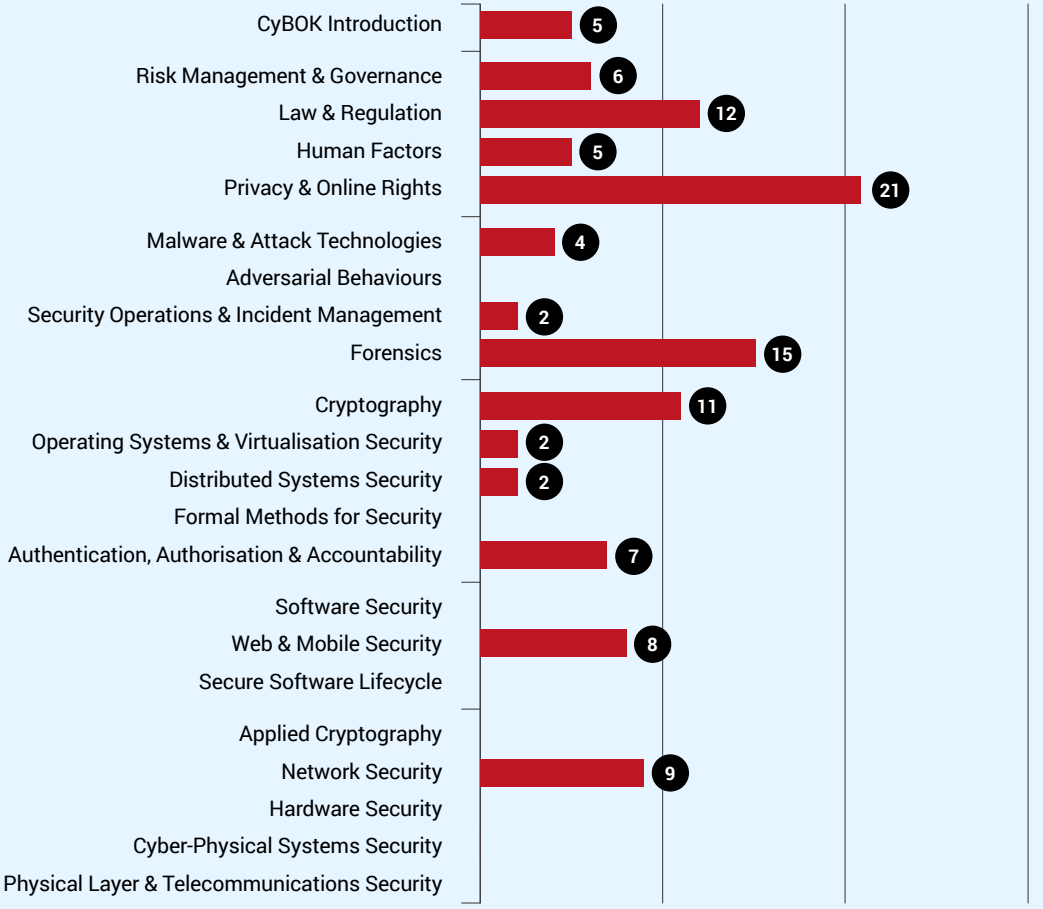
Number of credits

University of Kent

MSc Cyber Security





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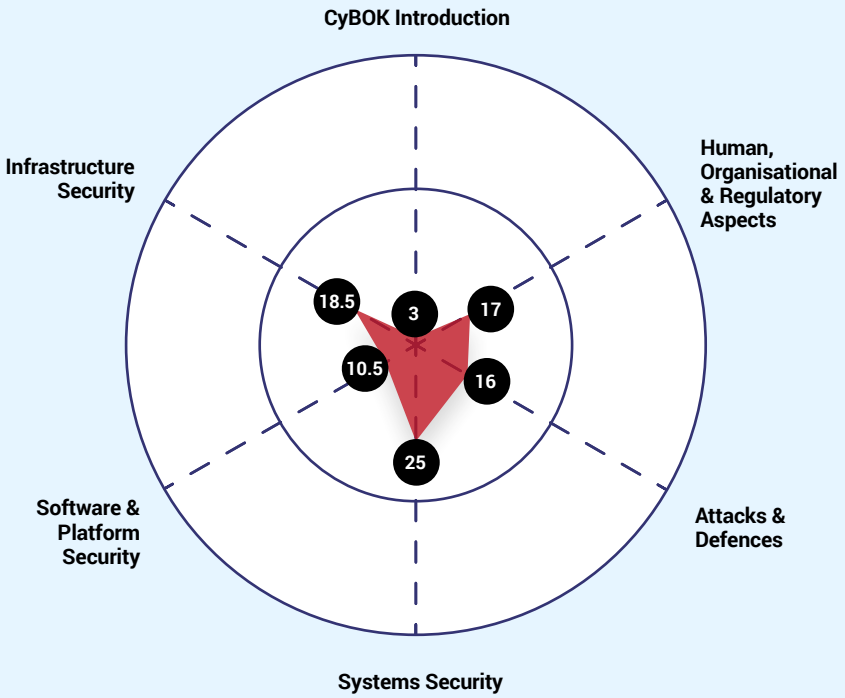
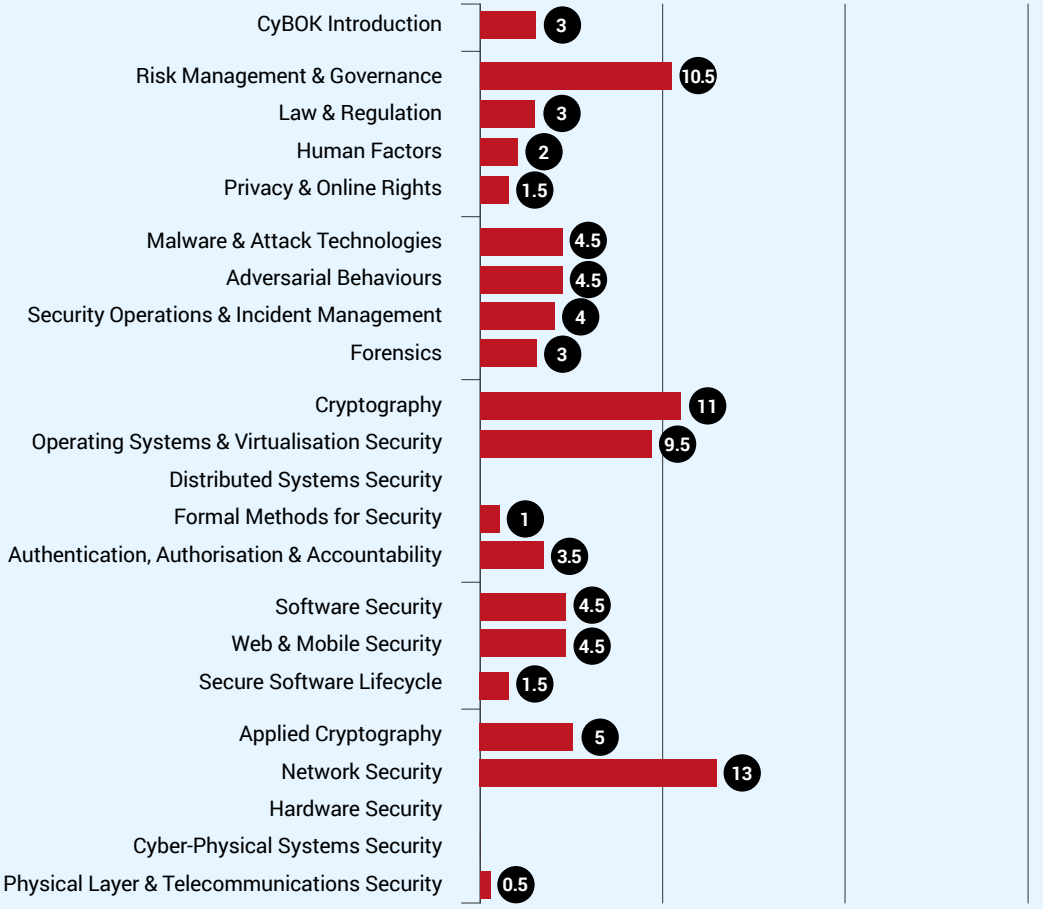
Number of credits

King's College London

MSc Cyber Security





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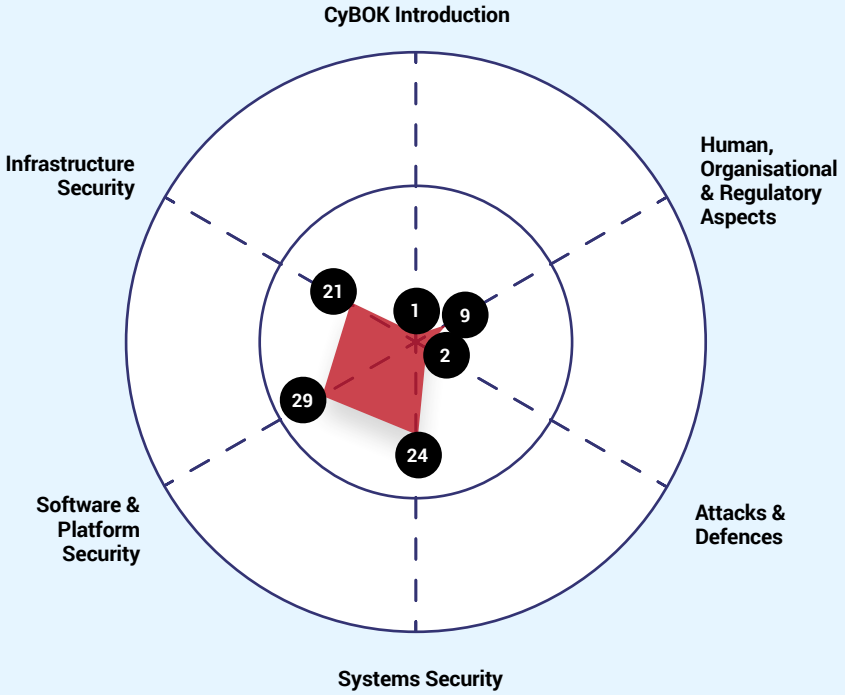
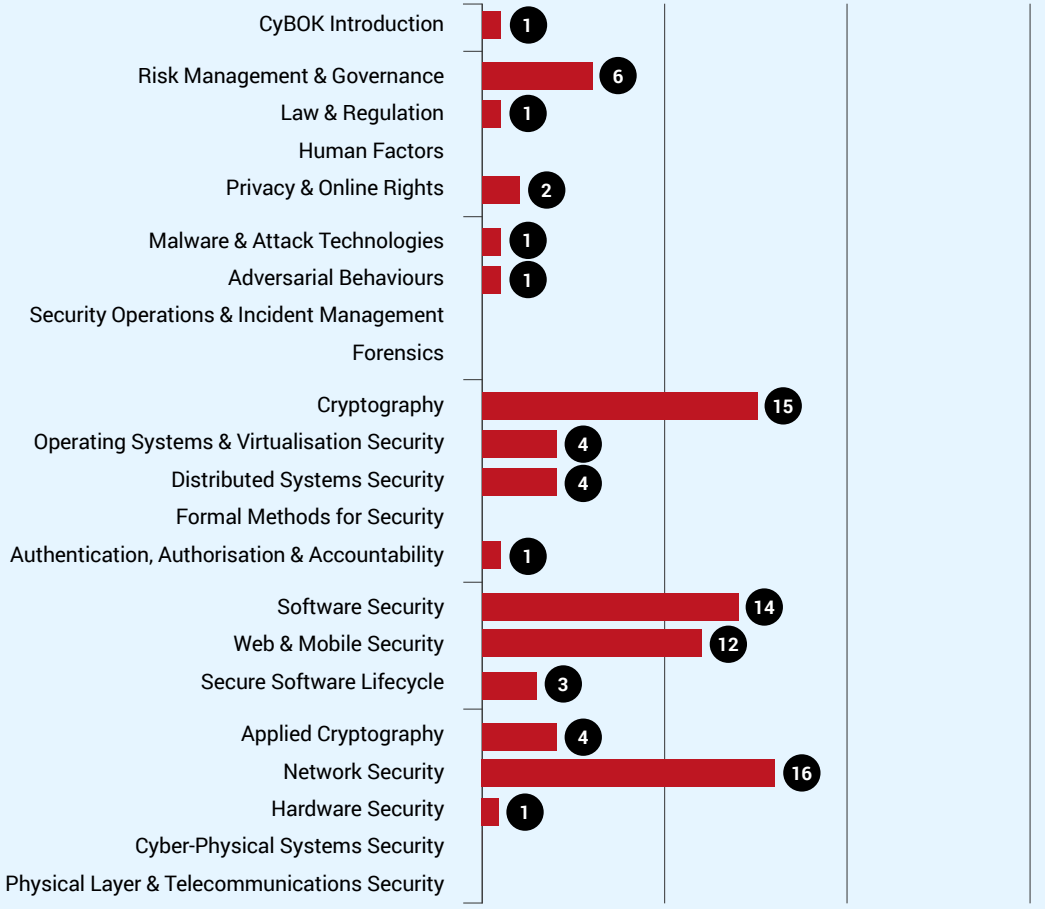
Number of credits

Kingston University

MSc Network and Information Security (Cyber Pathway)





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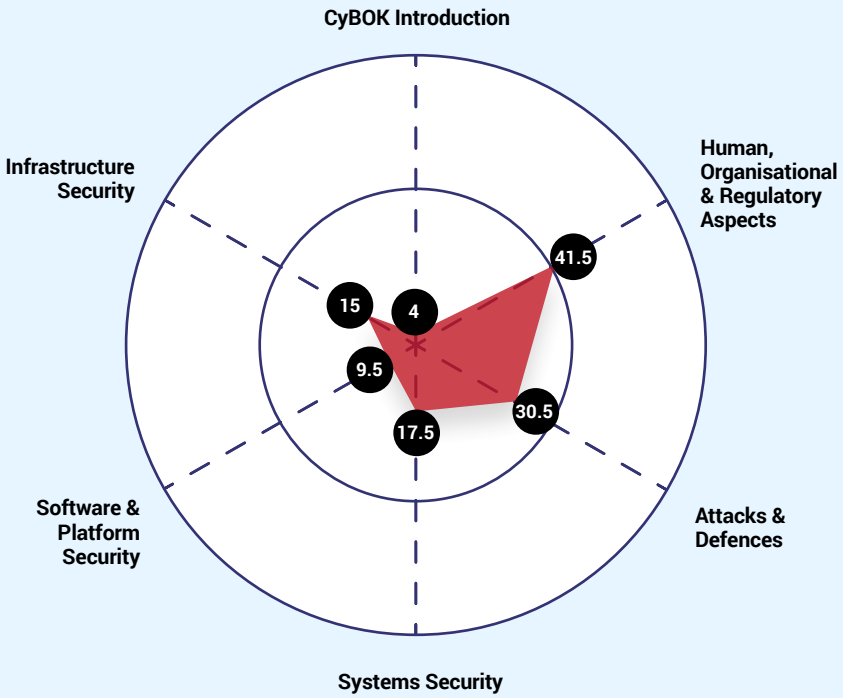
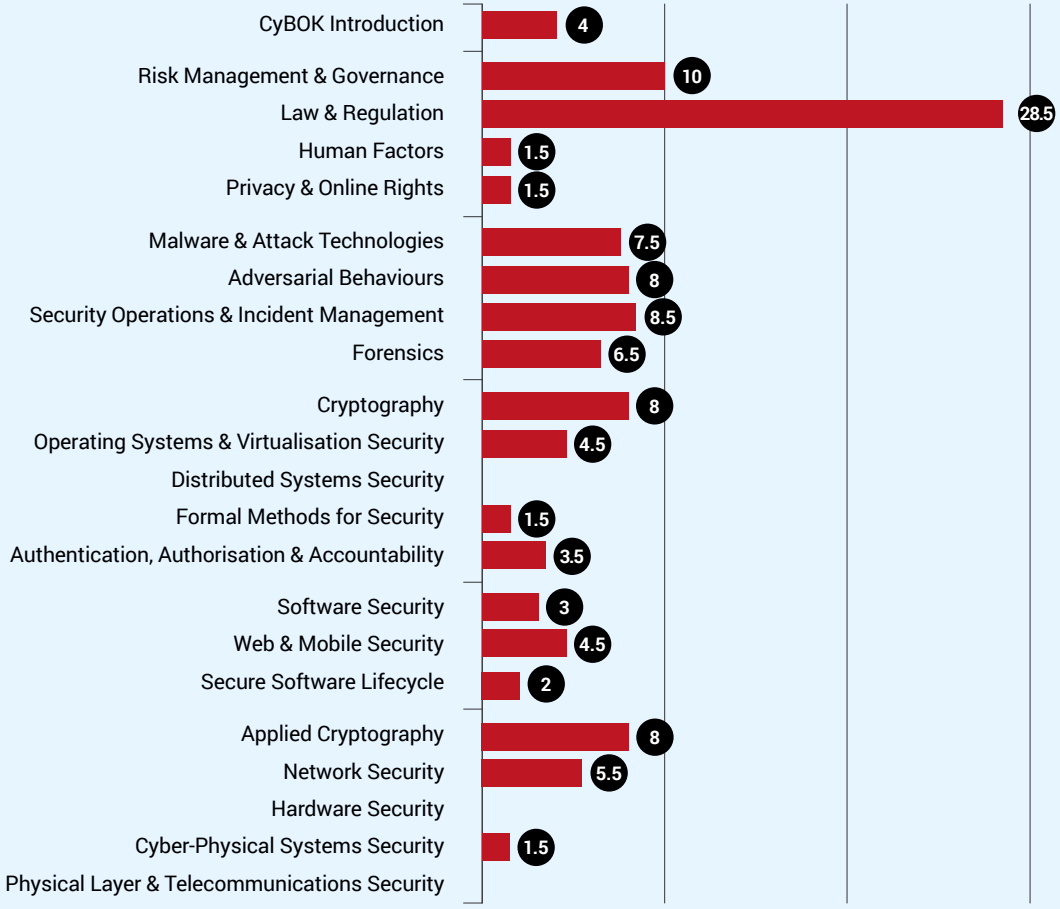
Number of credits

Lancaster University

MSc Cyber Security





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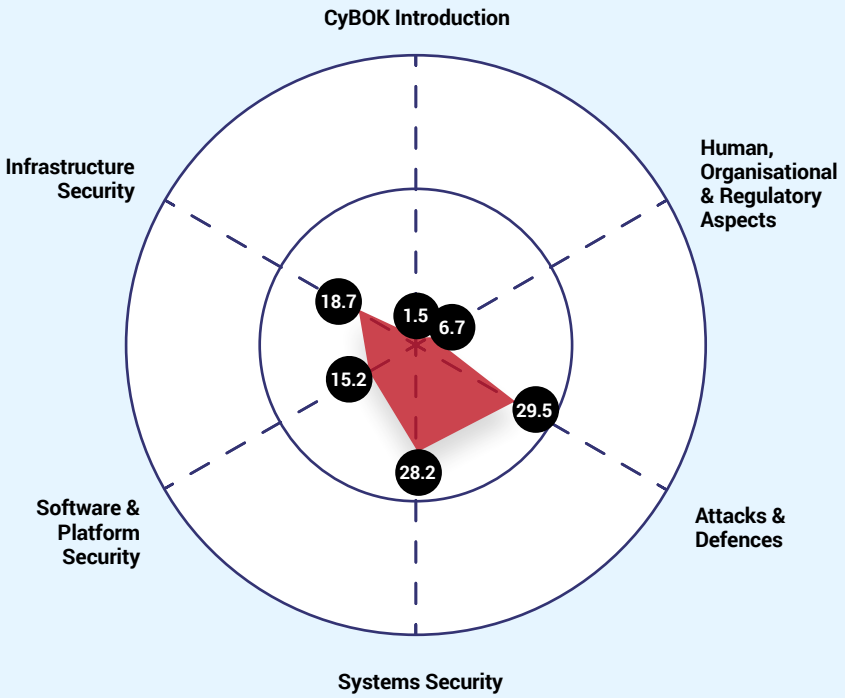
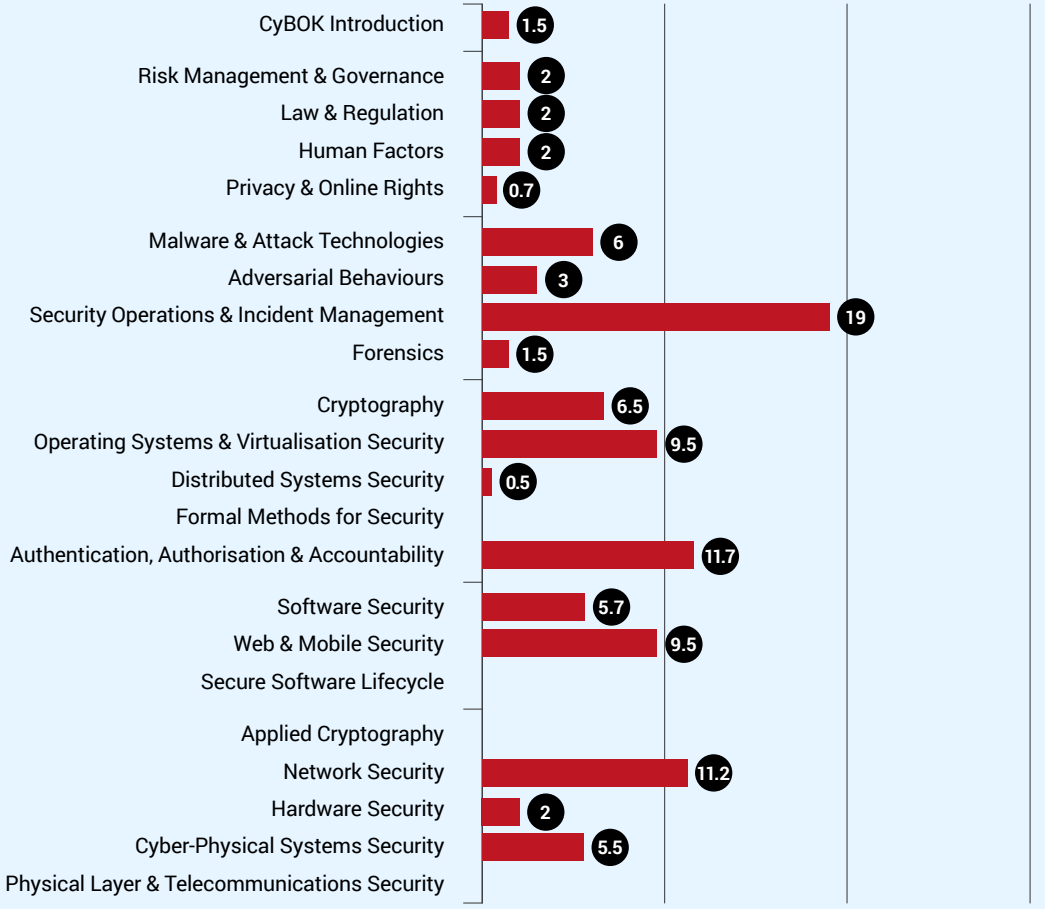
Number of credits

Leeds Beckett University

MSc Cyber Security





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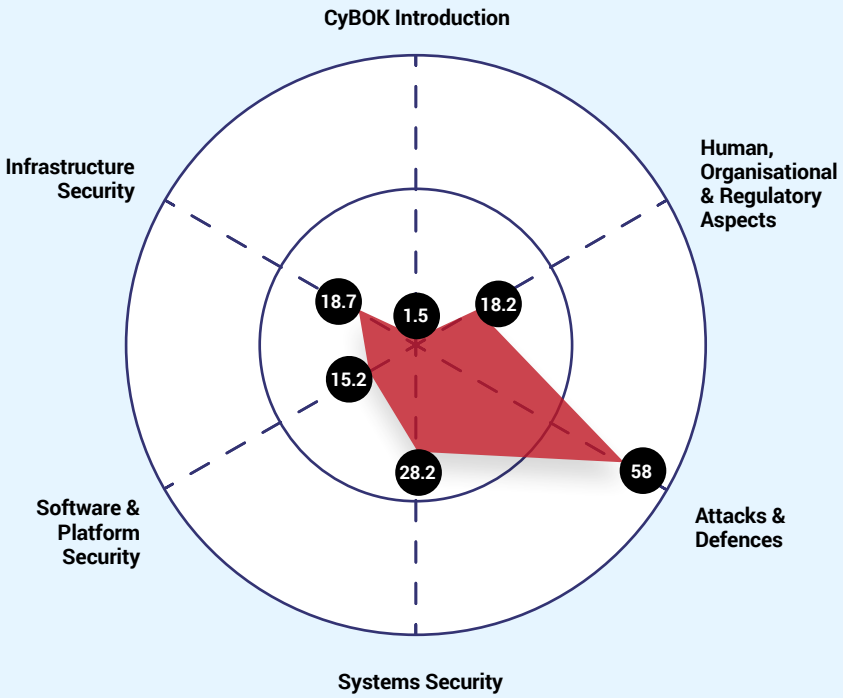
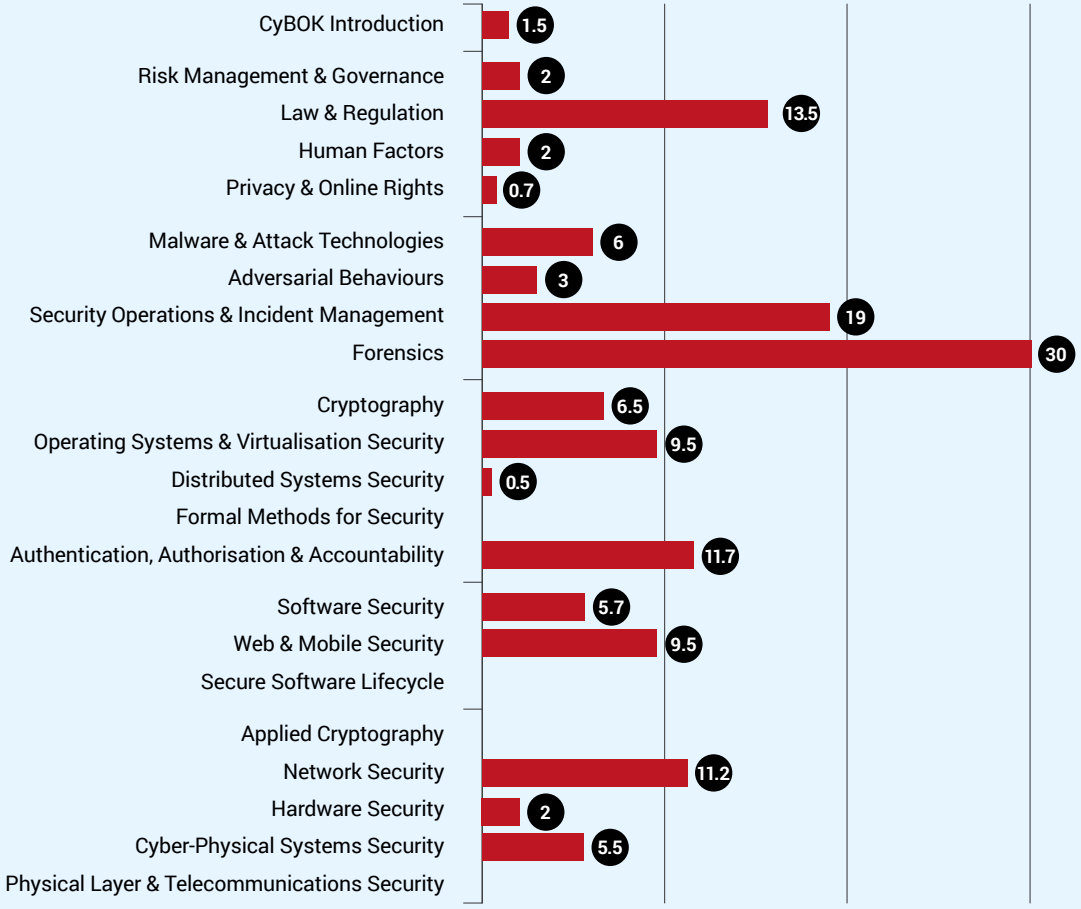
Number of credits

Leeds Beckett University

BSc Cyber Security





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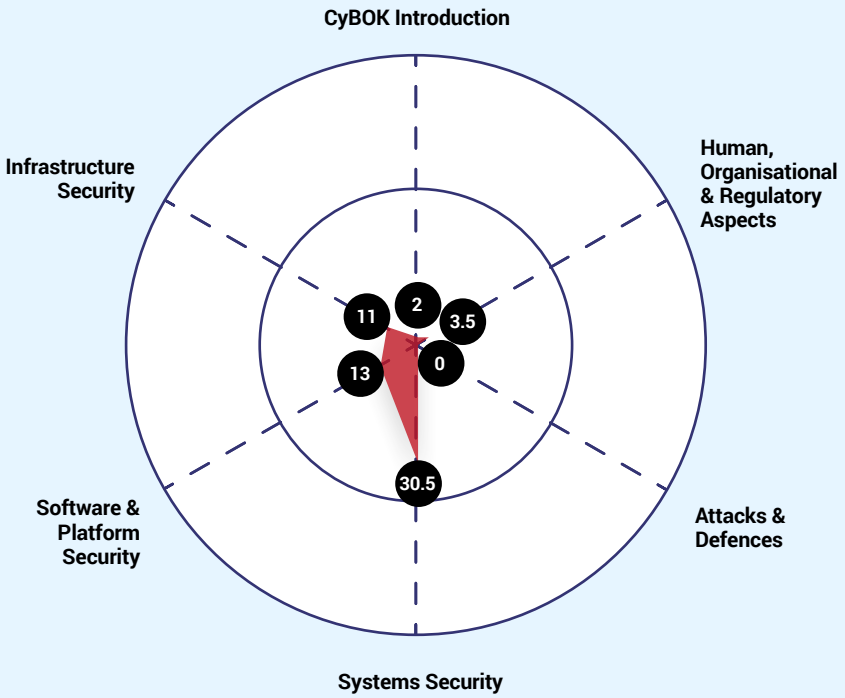
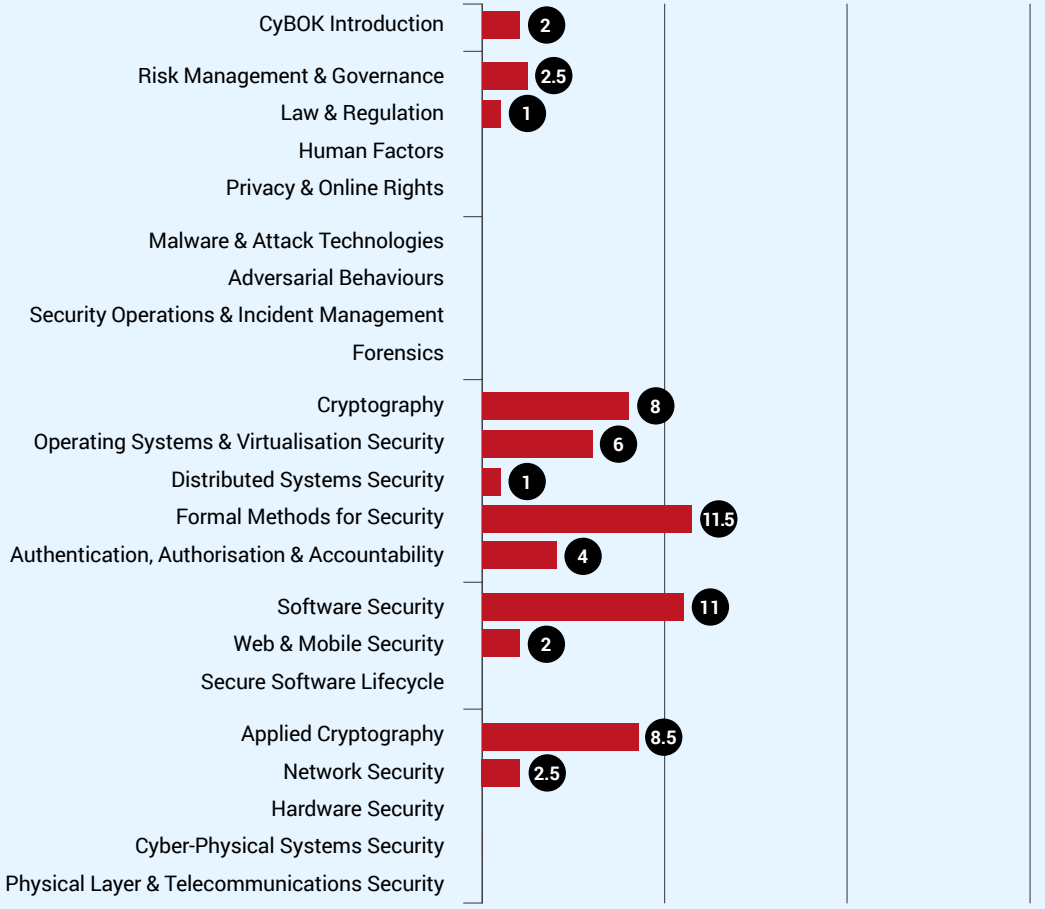
Number of credits

University of Manchester

MSc Advanced Computer Science (Computer Security)





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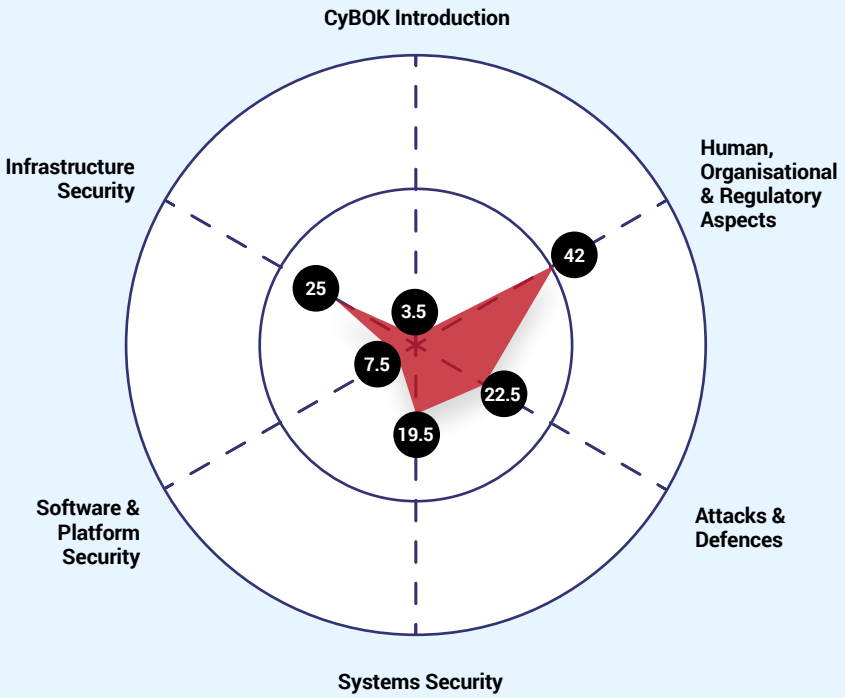
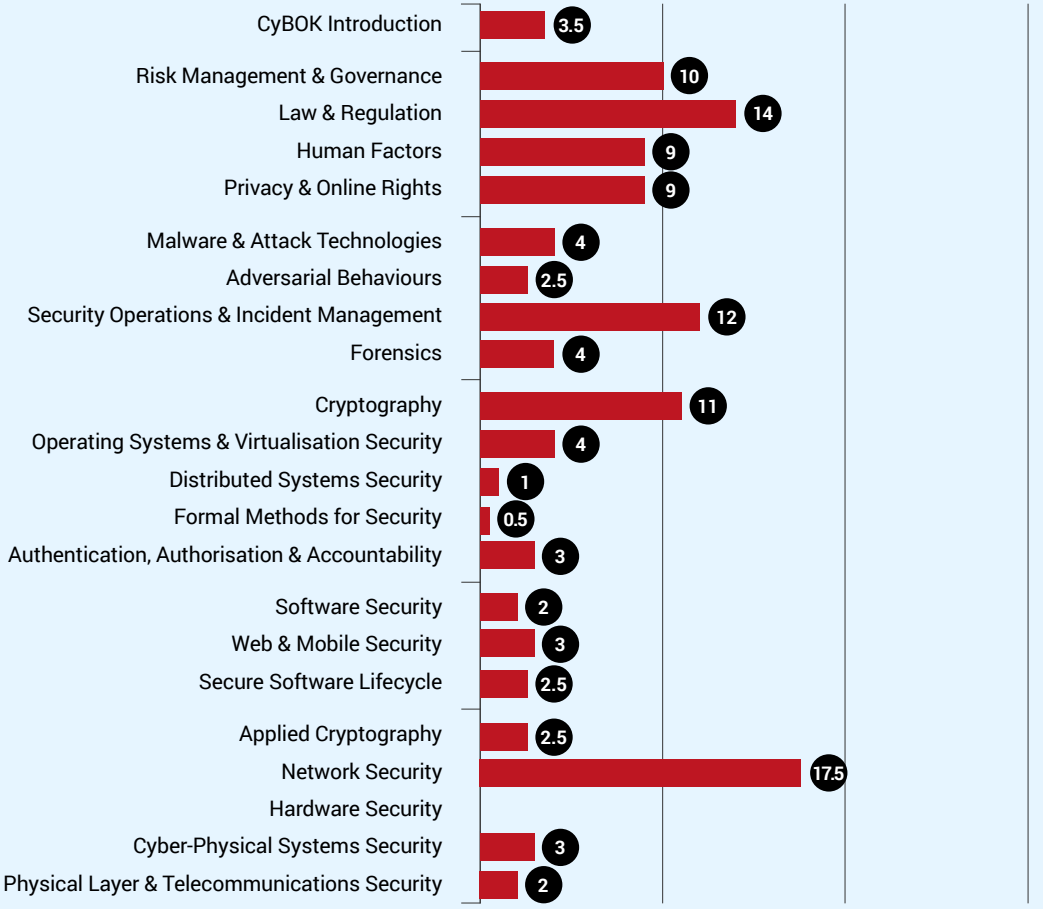
Number of credits

Northumbria University

MSc Cyber Security





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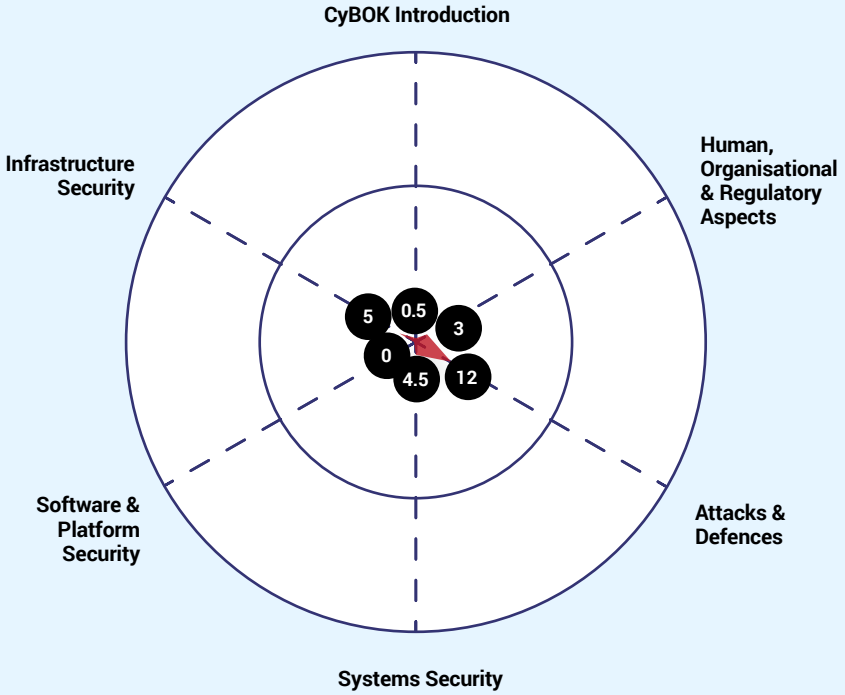
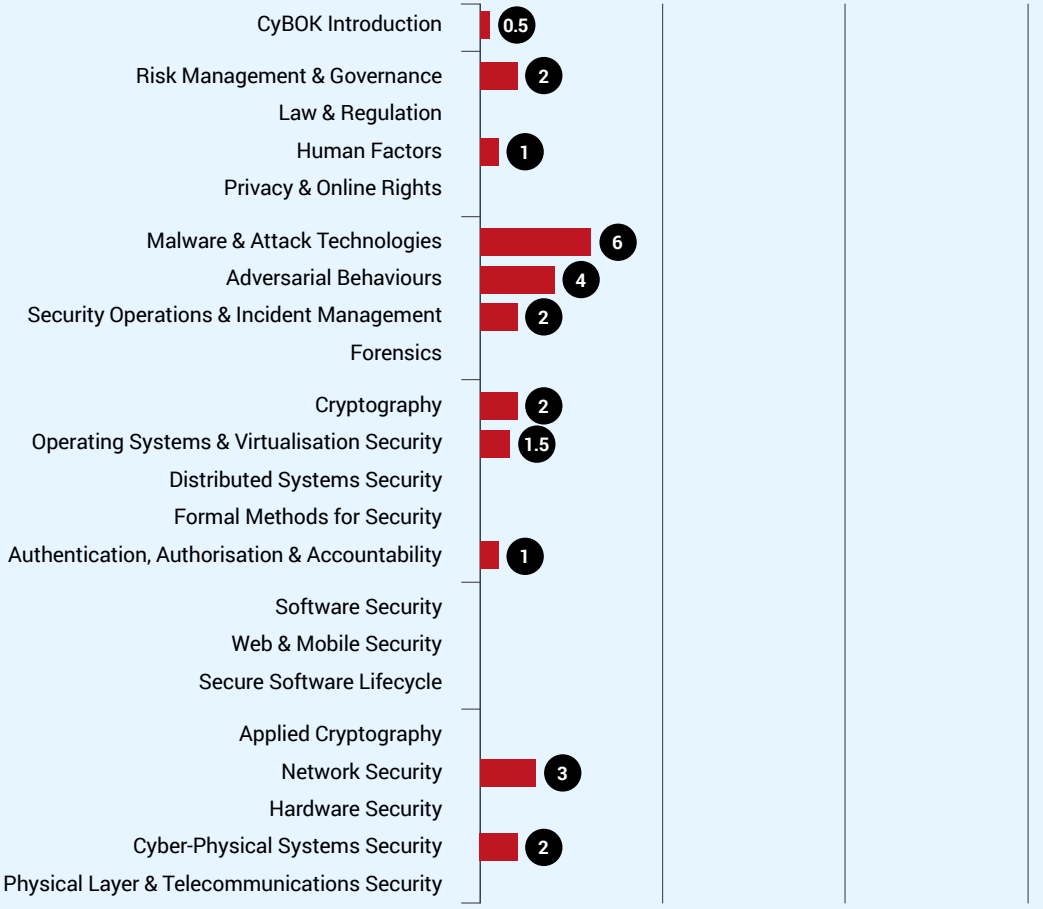
Number of credits

University of Nottingham

MSc Cyber Physical Systems





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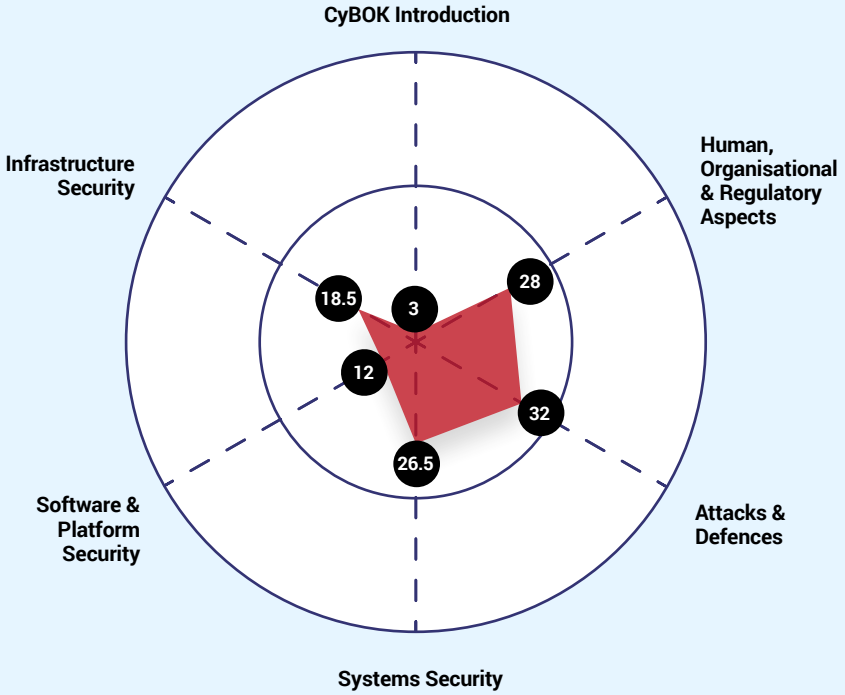
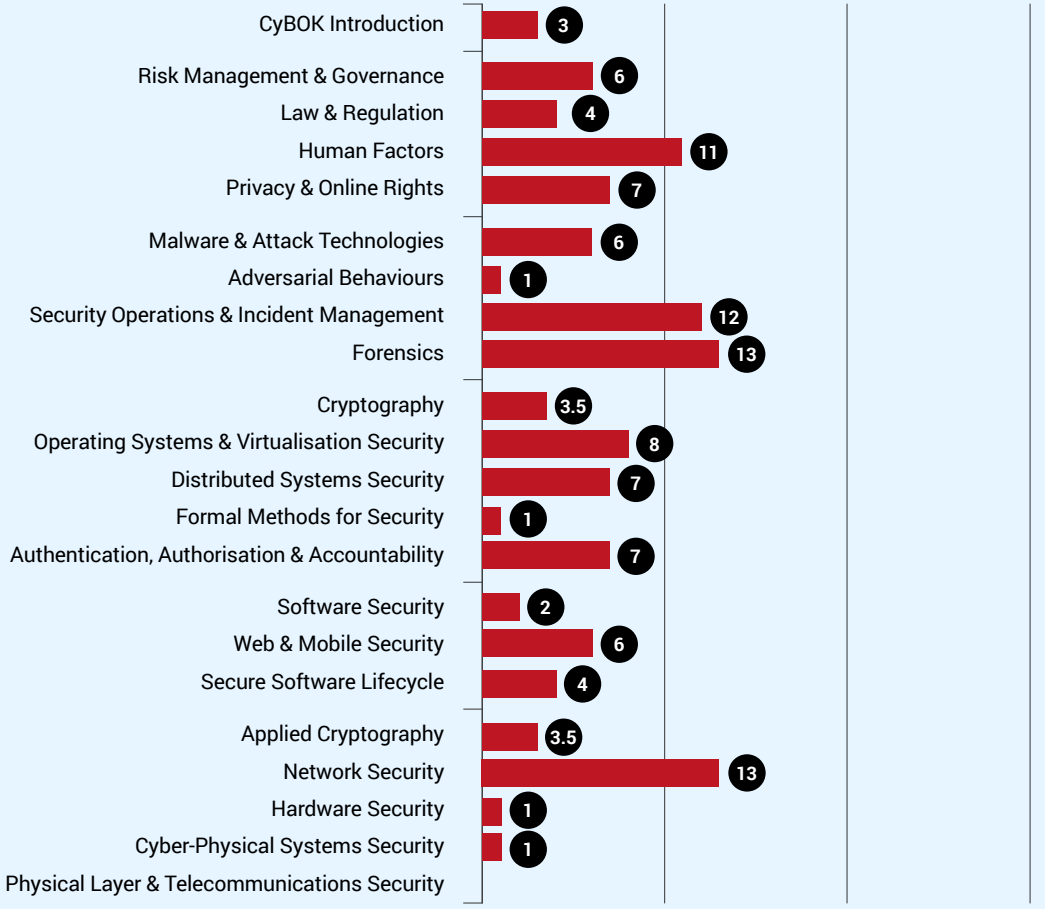
Number of credits

University of Oxford

MSc Software and Systems Security (Showing One of the Many Pathways)





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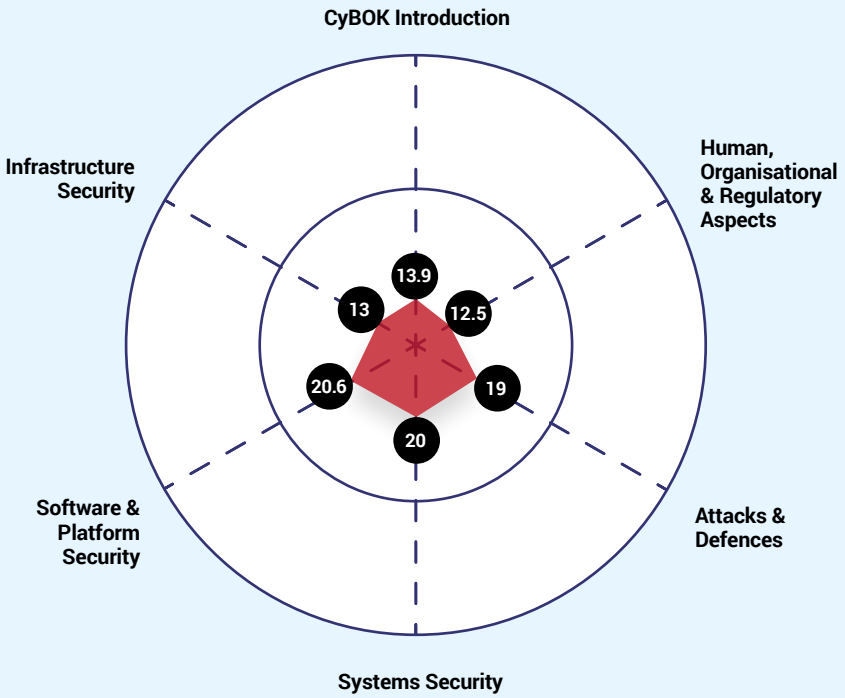
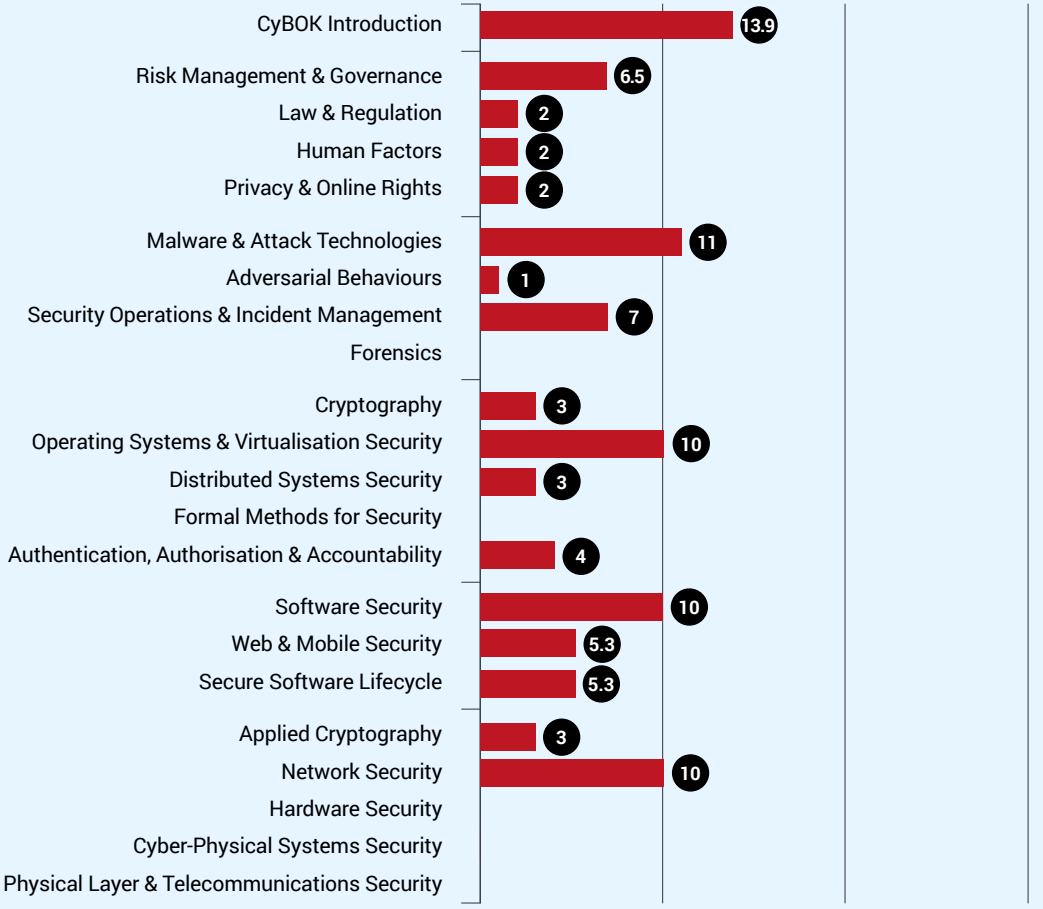
Number of credits

Oxford Brookes University

MSc Computer Science for Cyber Security





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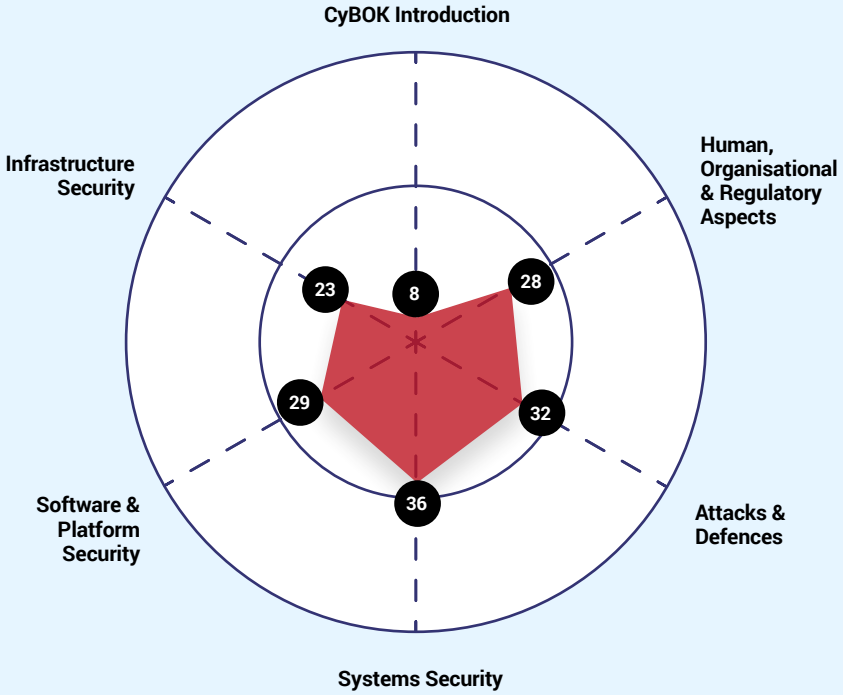
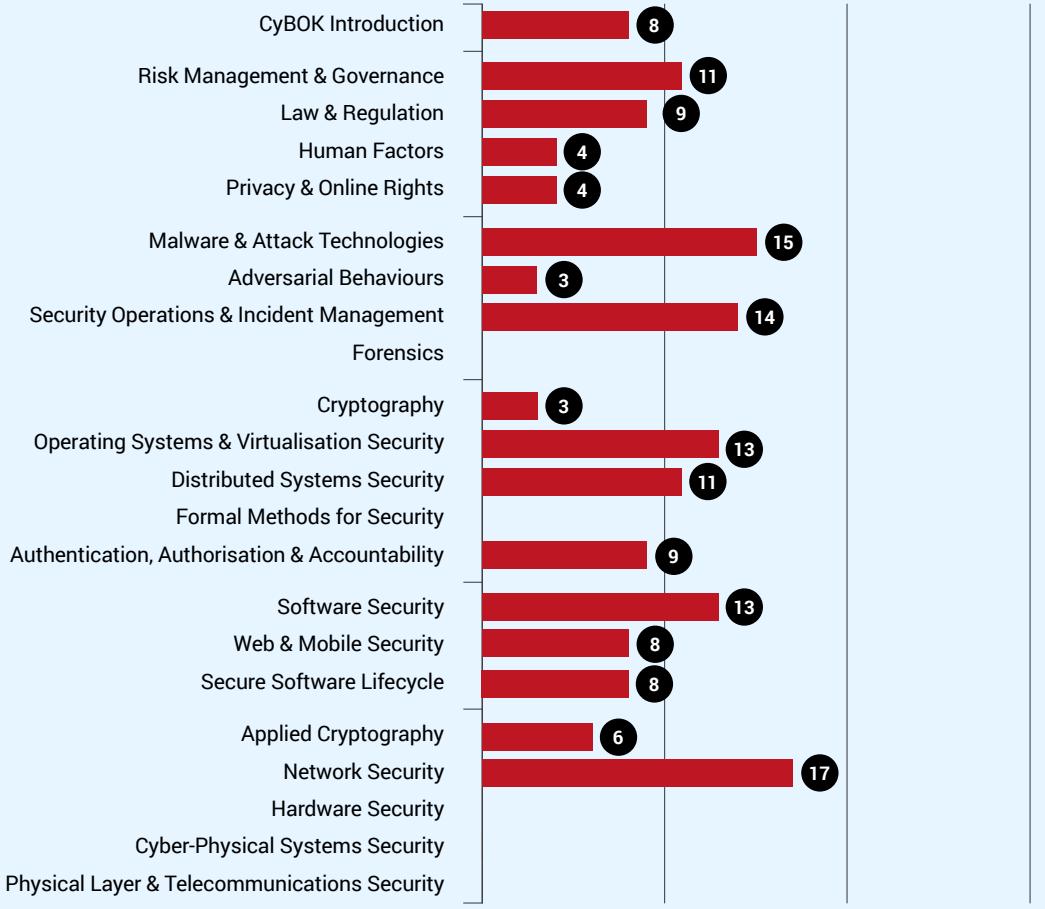
Number of credits

Oxford Brookes University

BSc Computer Science for Cyber Security





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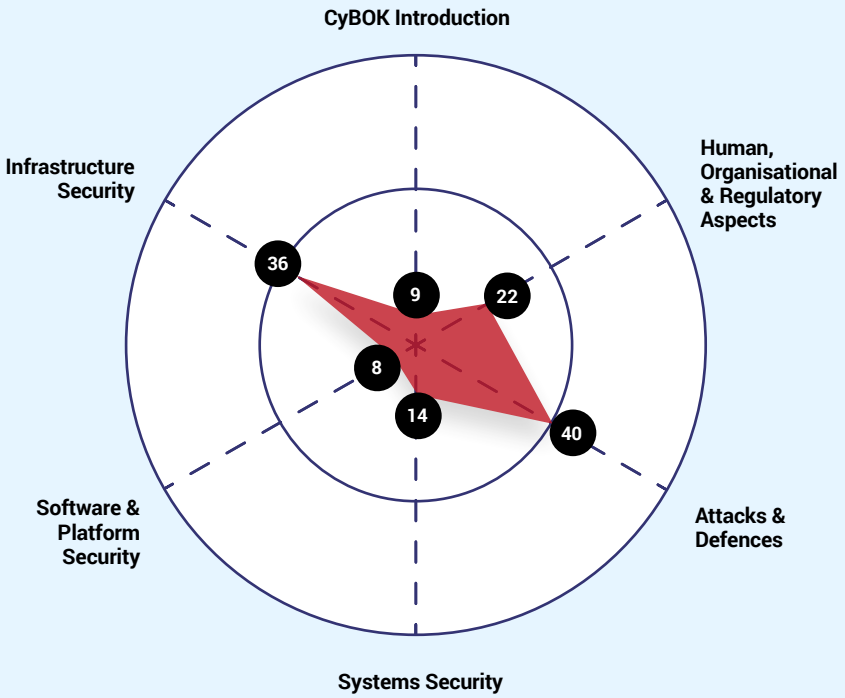
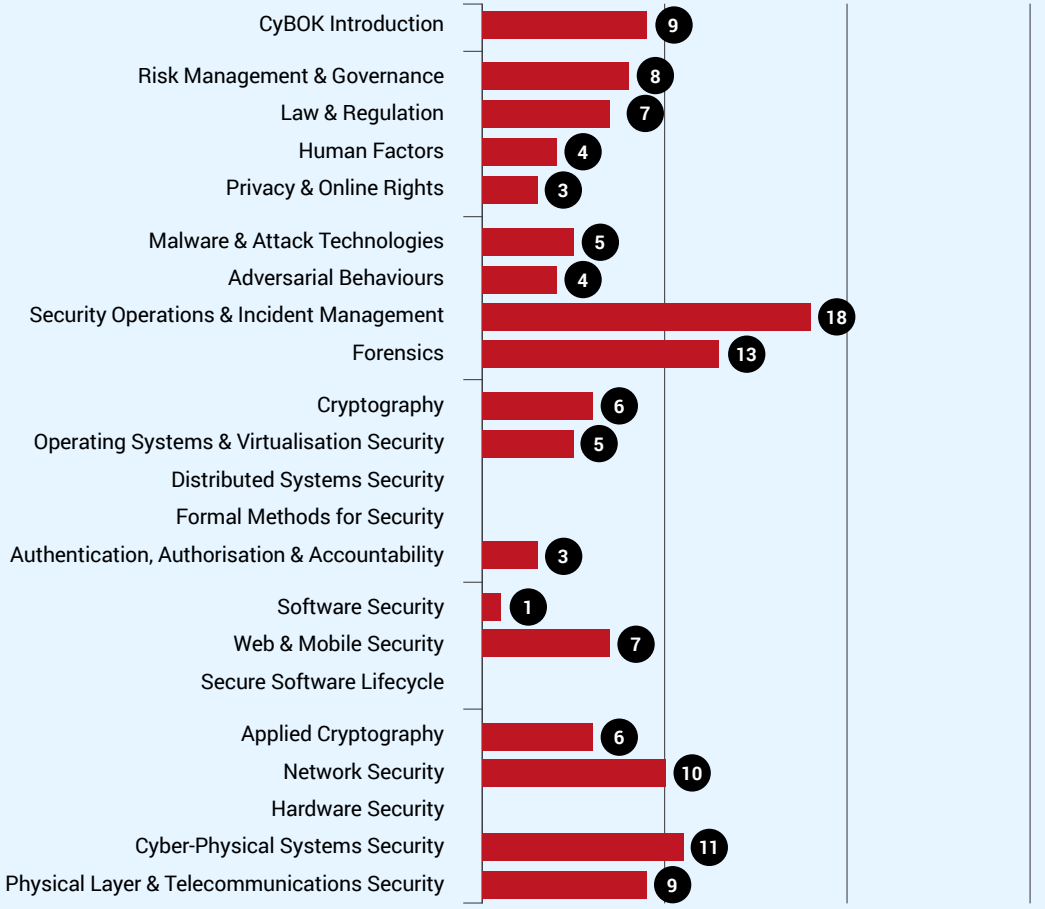
Number of credits

University of Plymouth

MSc Cyber Security





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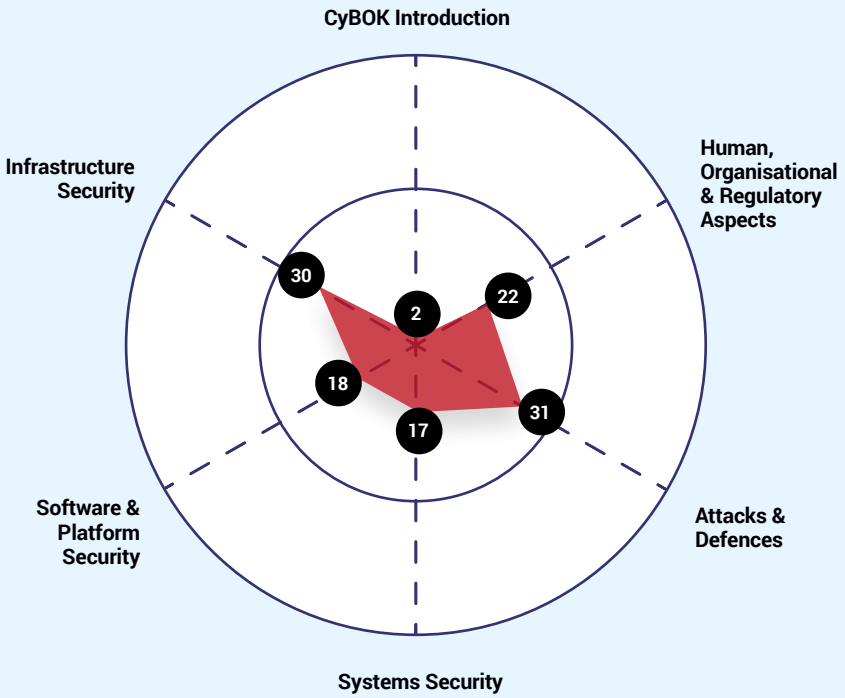
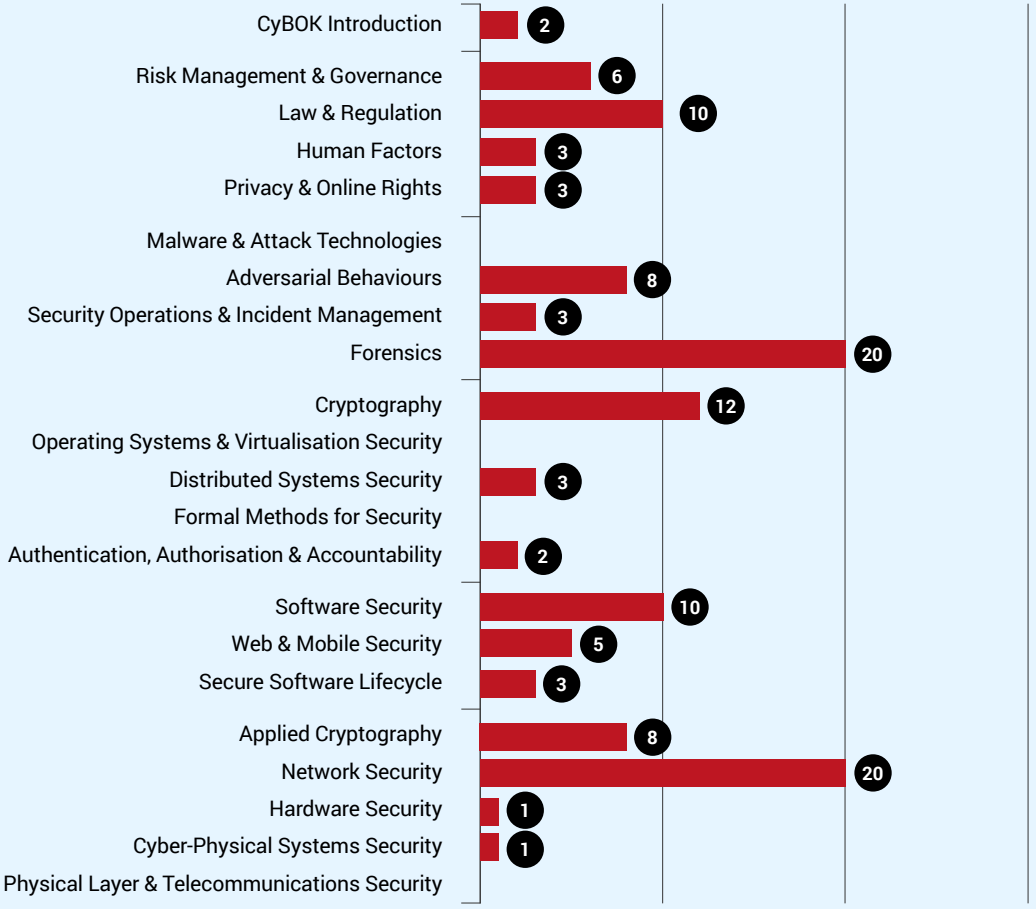
Number of credits

Queen's University Belfast

MSc Applied Cyber Security





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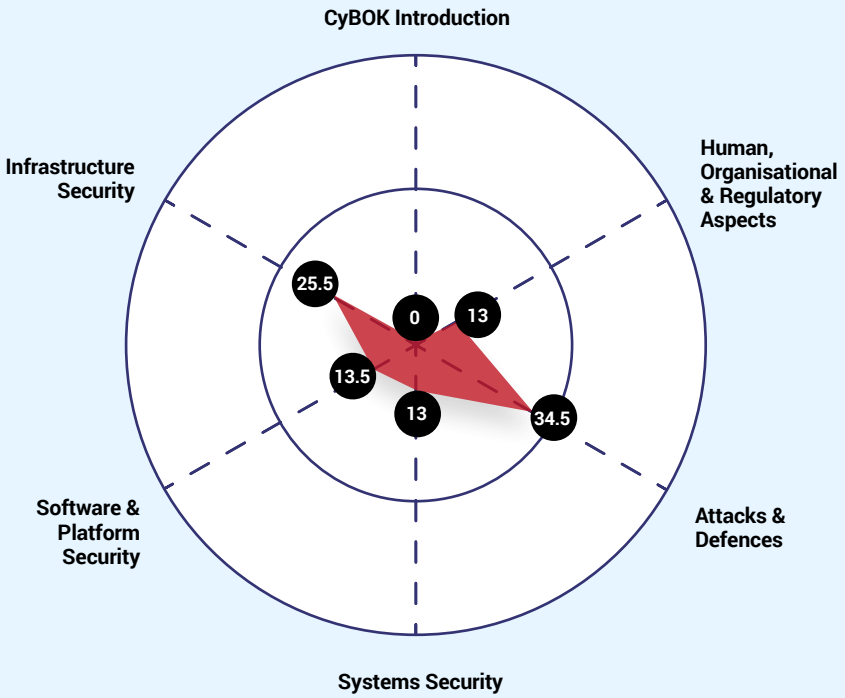
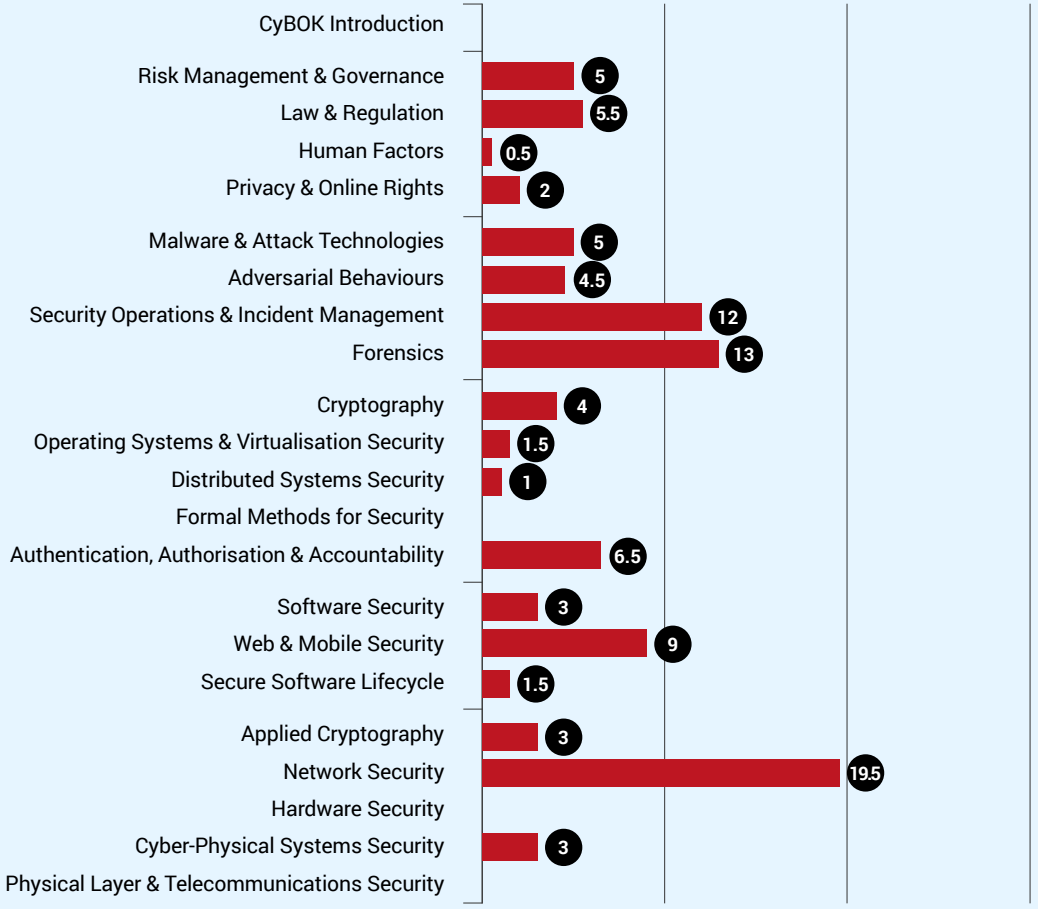
Number of credits

Robert Gordon University

MSc Cyber Security





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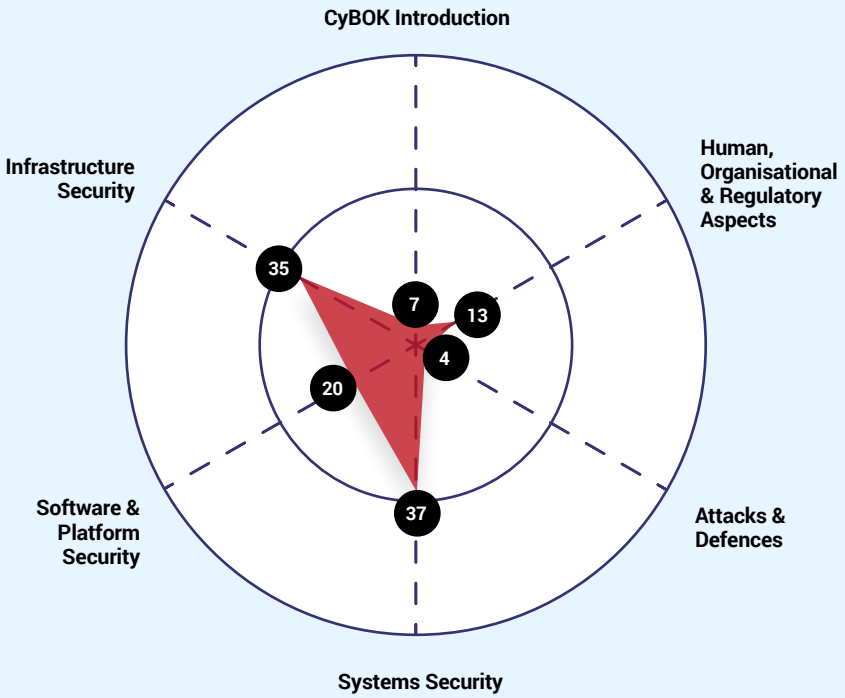
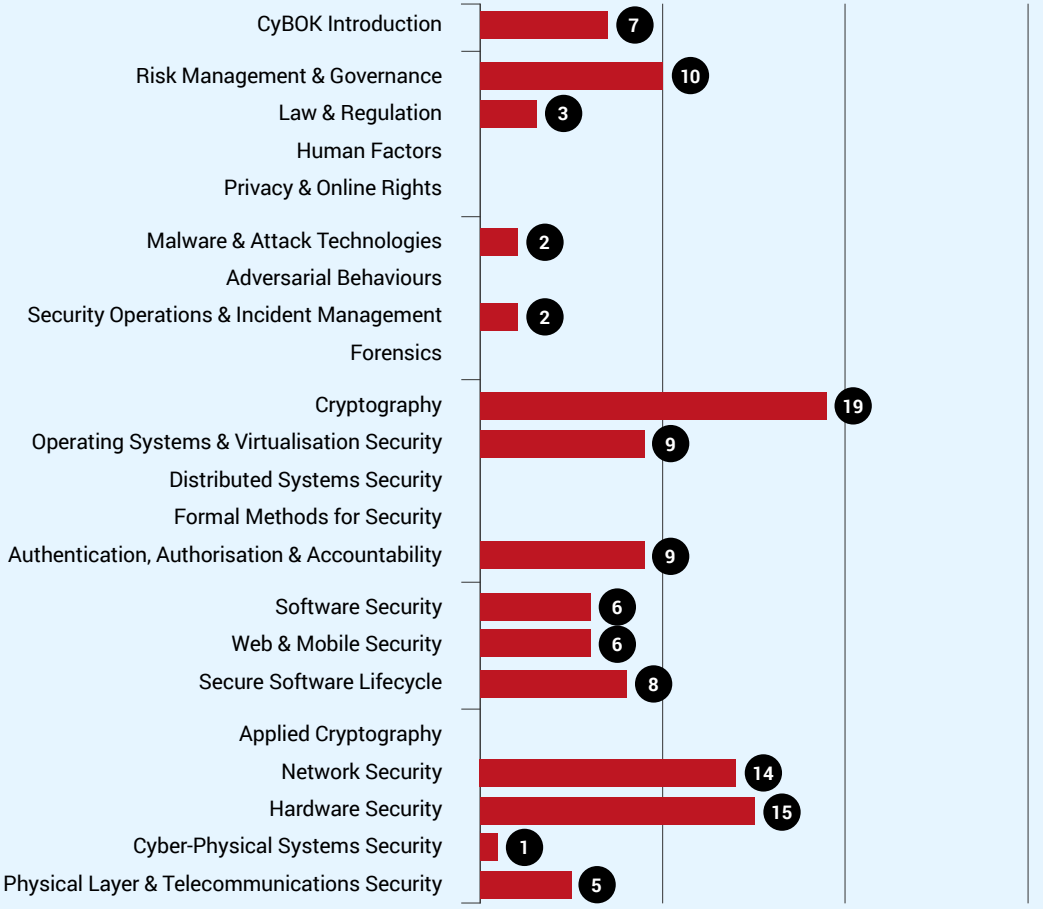
Number of credits

Royal Holloway, University of London

MSc Information Security (Showing One of the Many Pathways)





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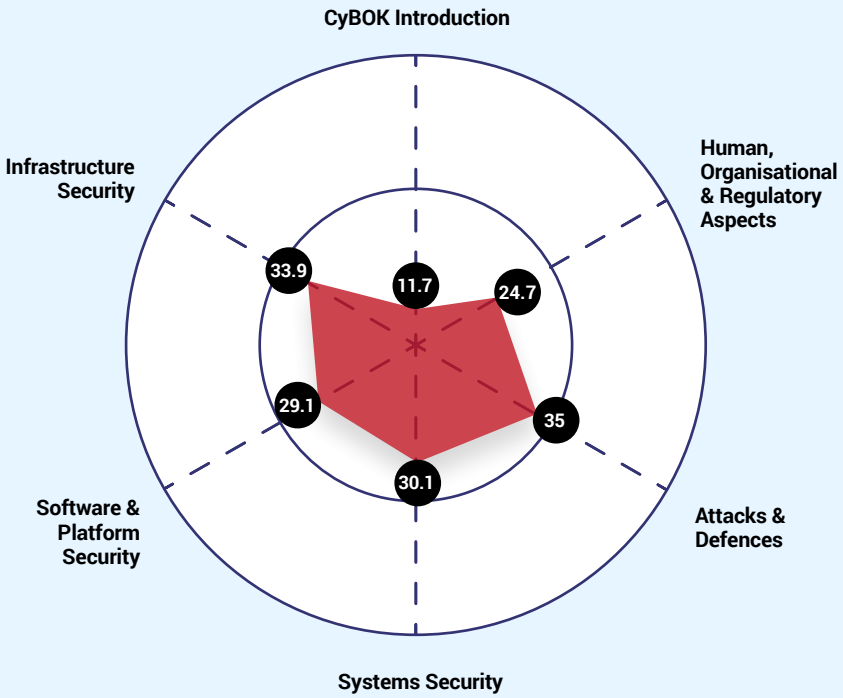
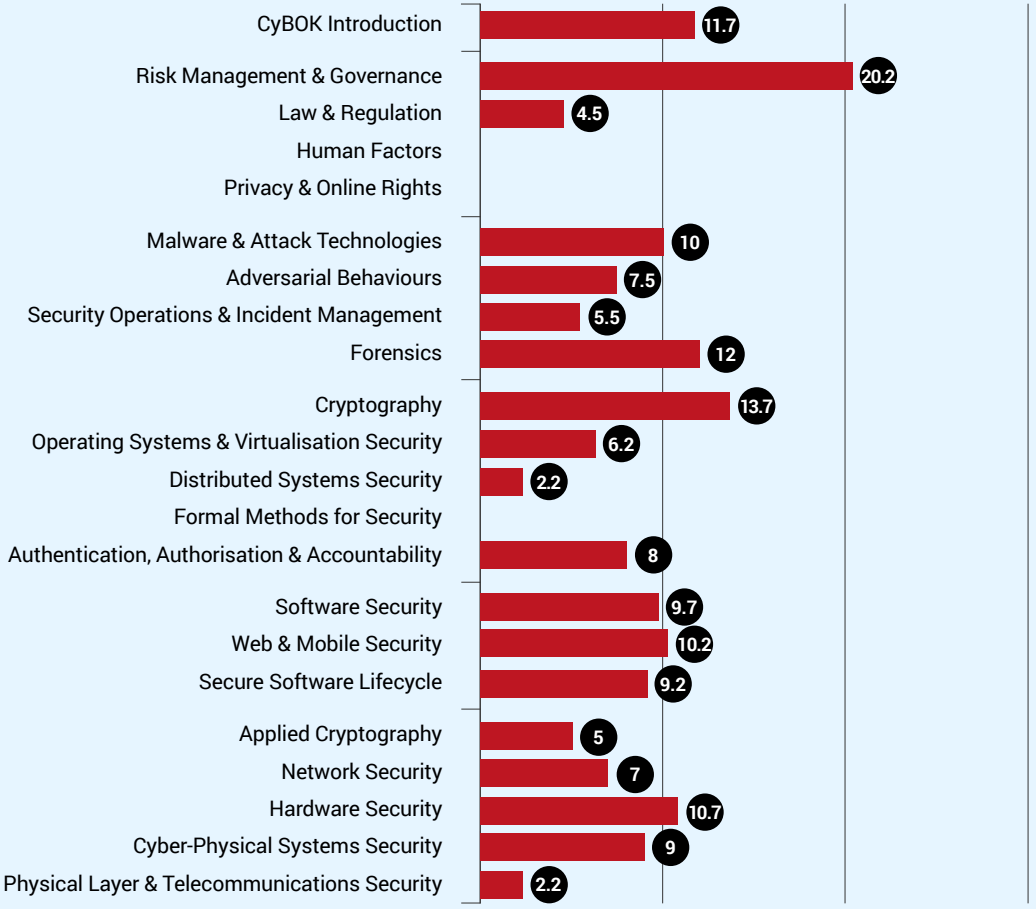
Number of credits

Royal Holloway, University of London

MSci Computer Science (Information Security)





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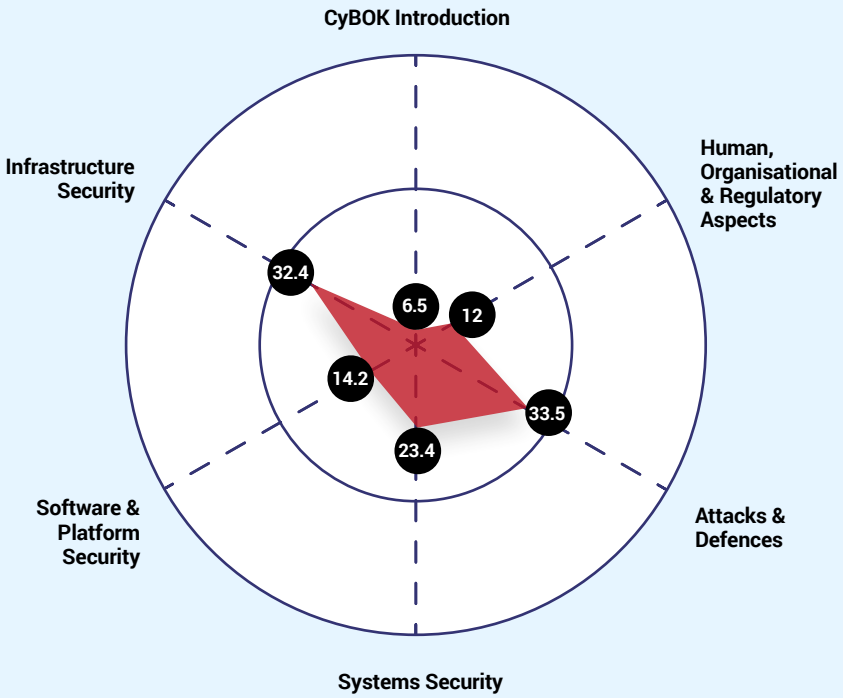
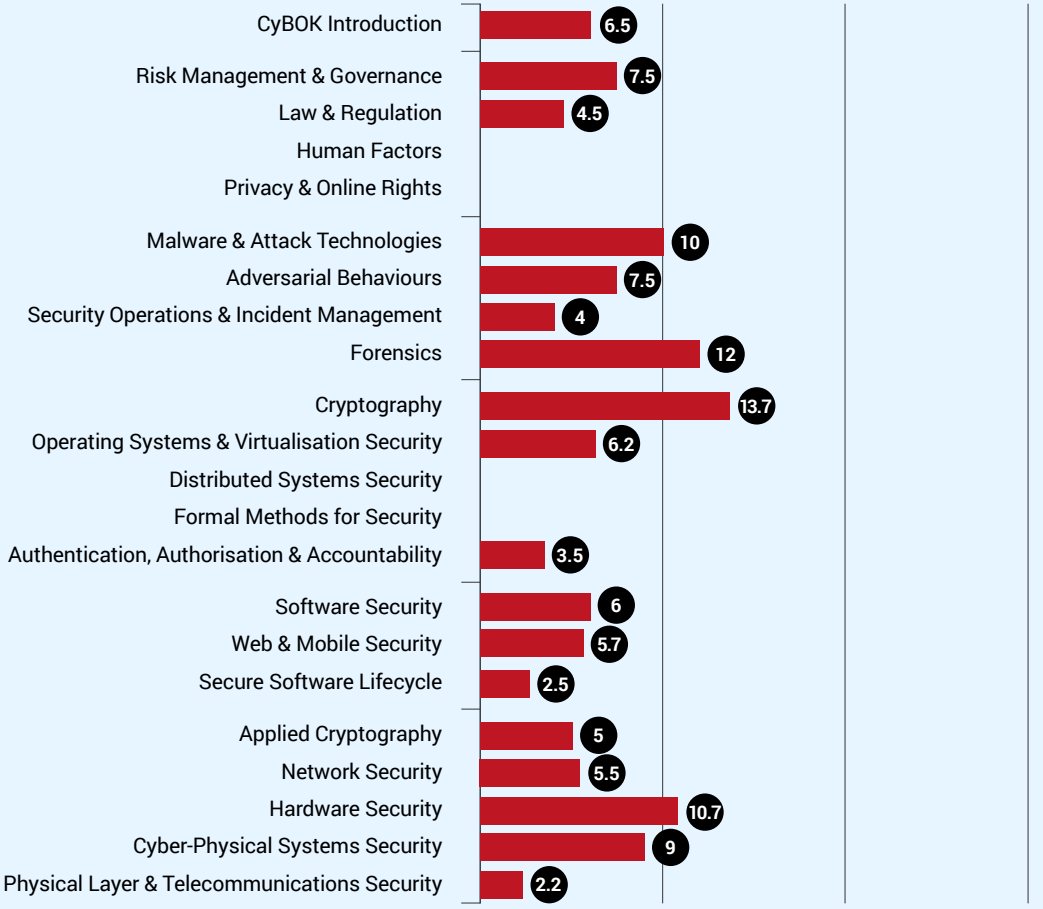
Number of credits

Royal Holloway, University of London

BSc Computer Science (Information Security)





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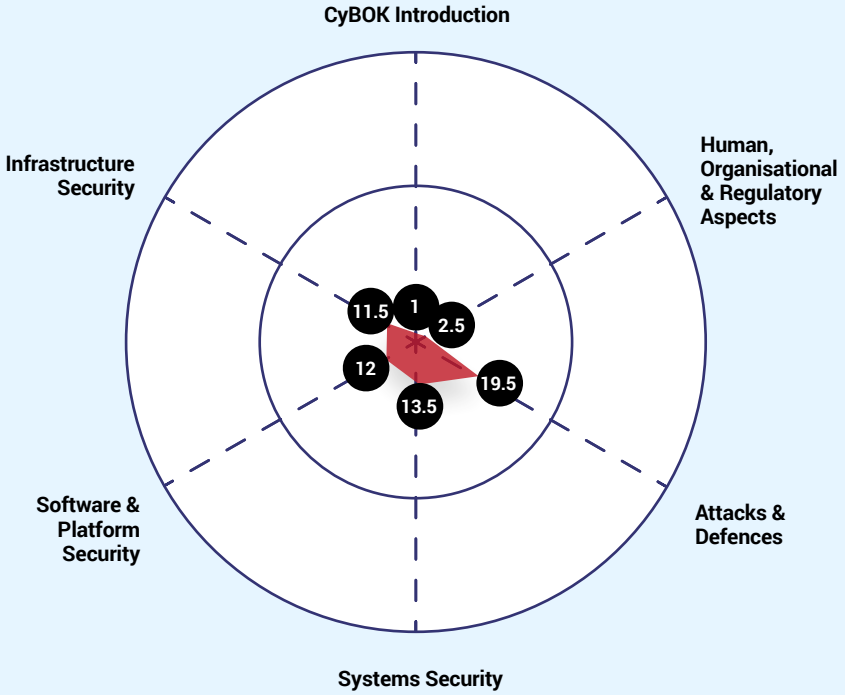
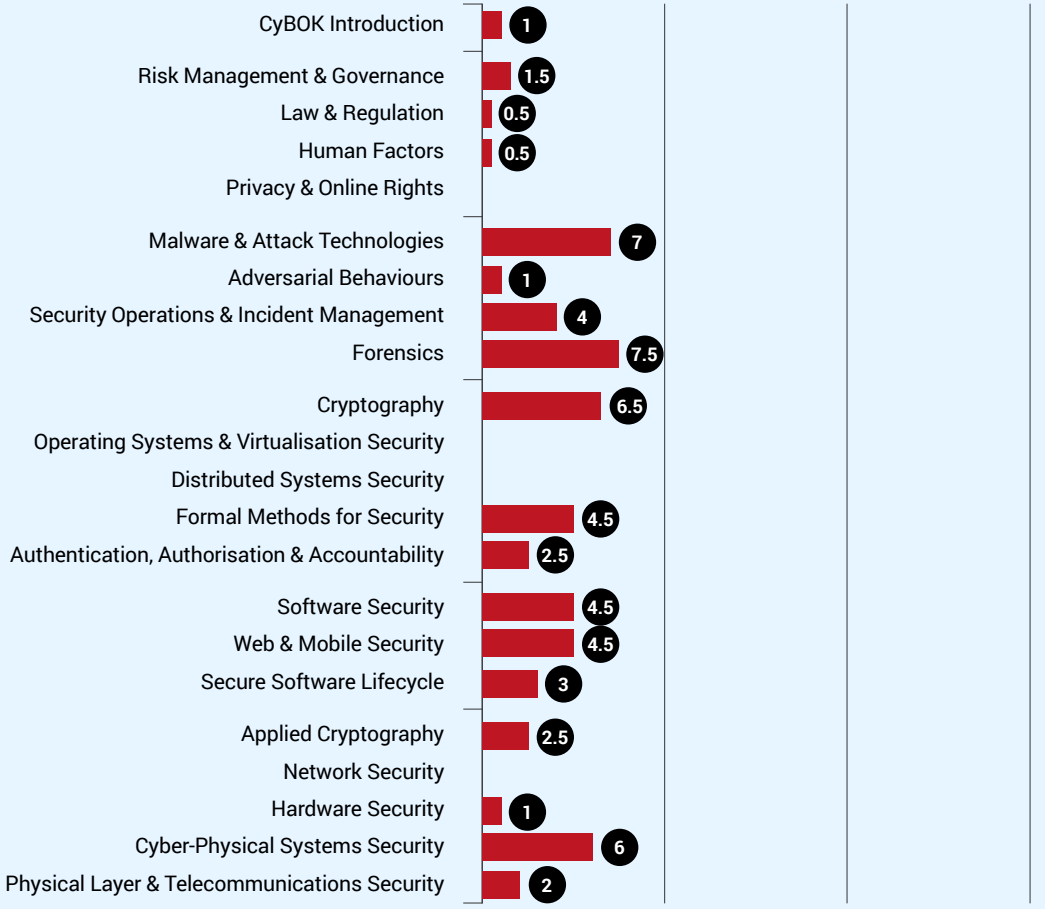
Number of credits

University of Sheffield

MSc Cyber Security and Artificial Intelligence





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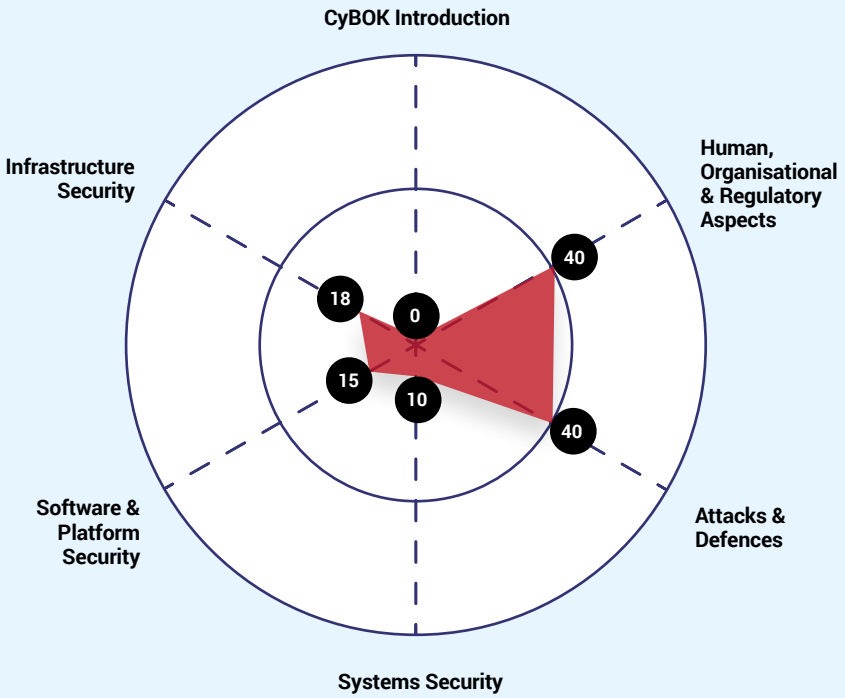
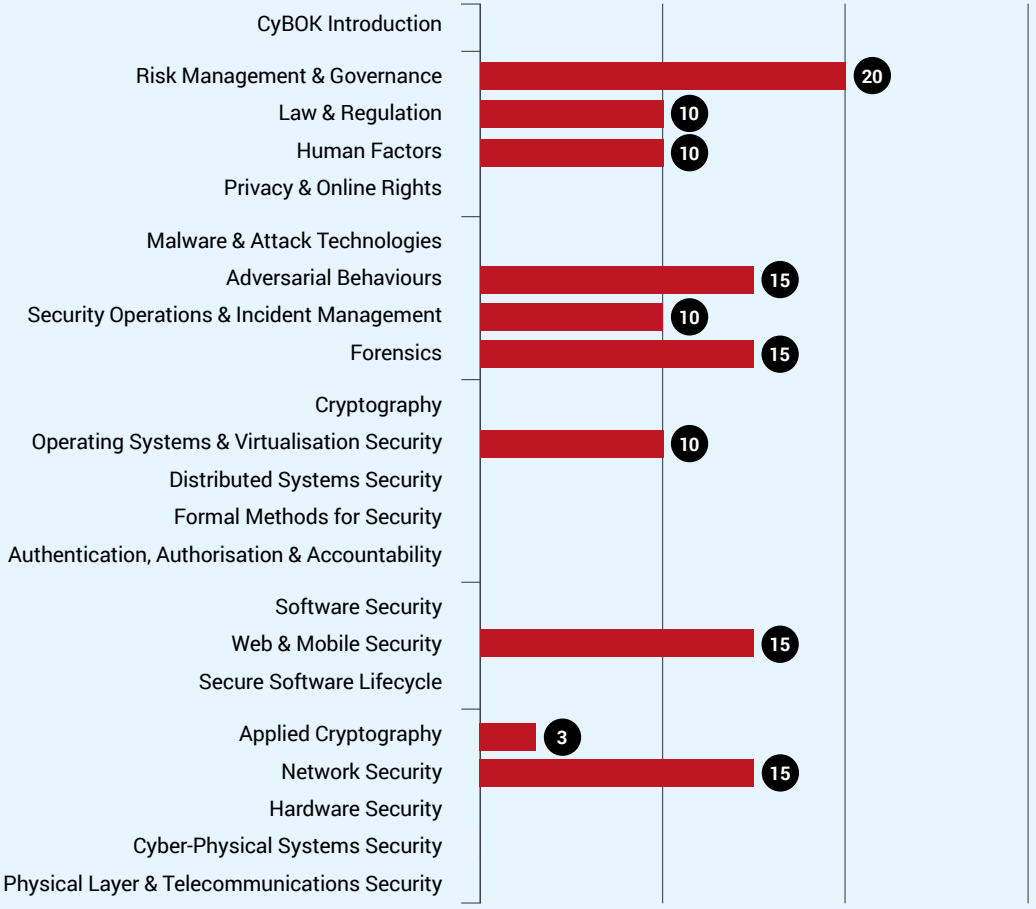
Number of credits

Sheffield Hallam University

MSc Cyber Security





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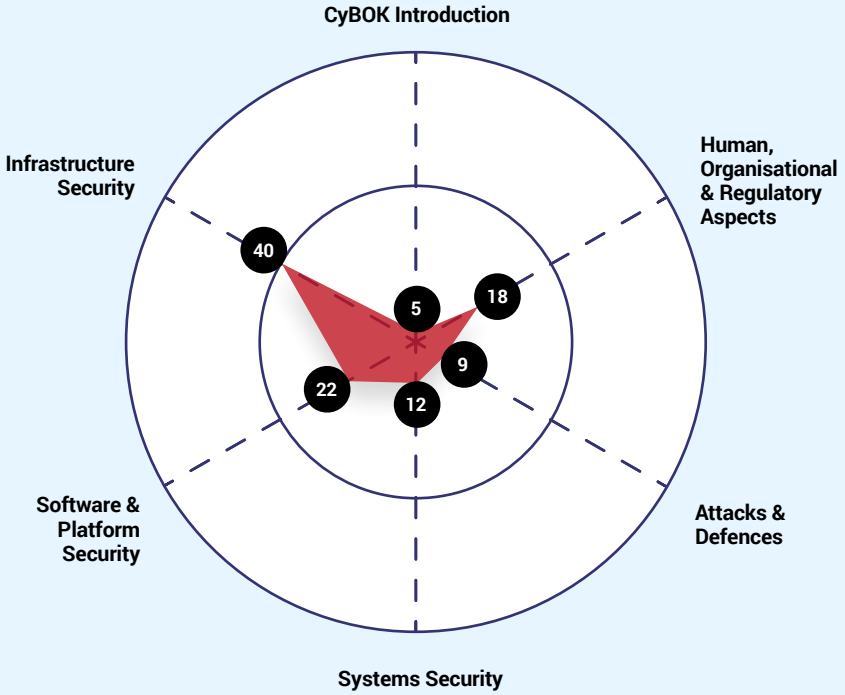
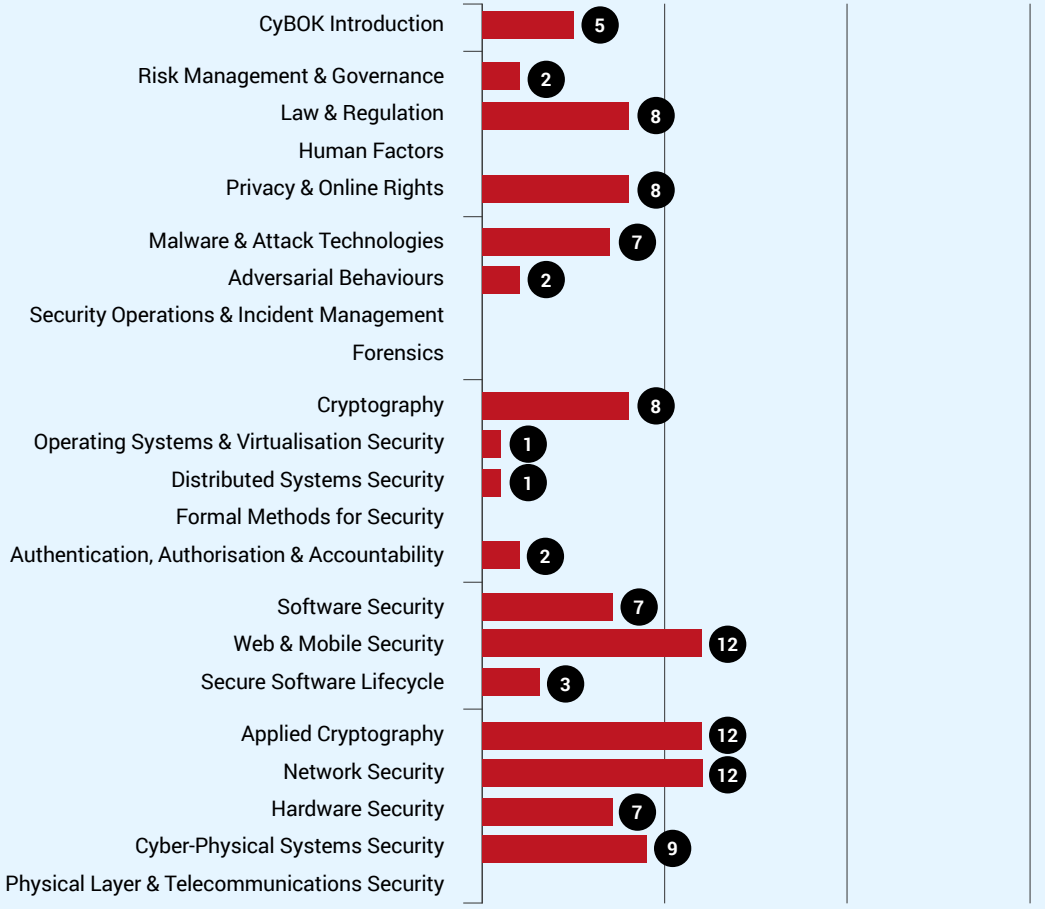
Number of credits

University of Southampton

MEng Computer Science with Cyber Security





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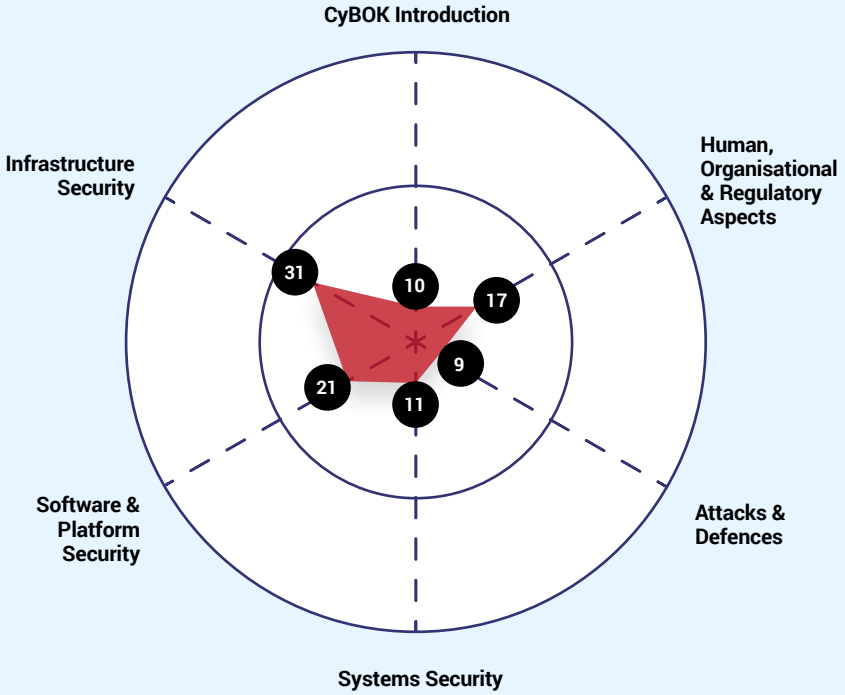
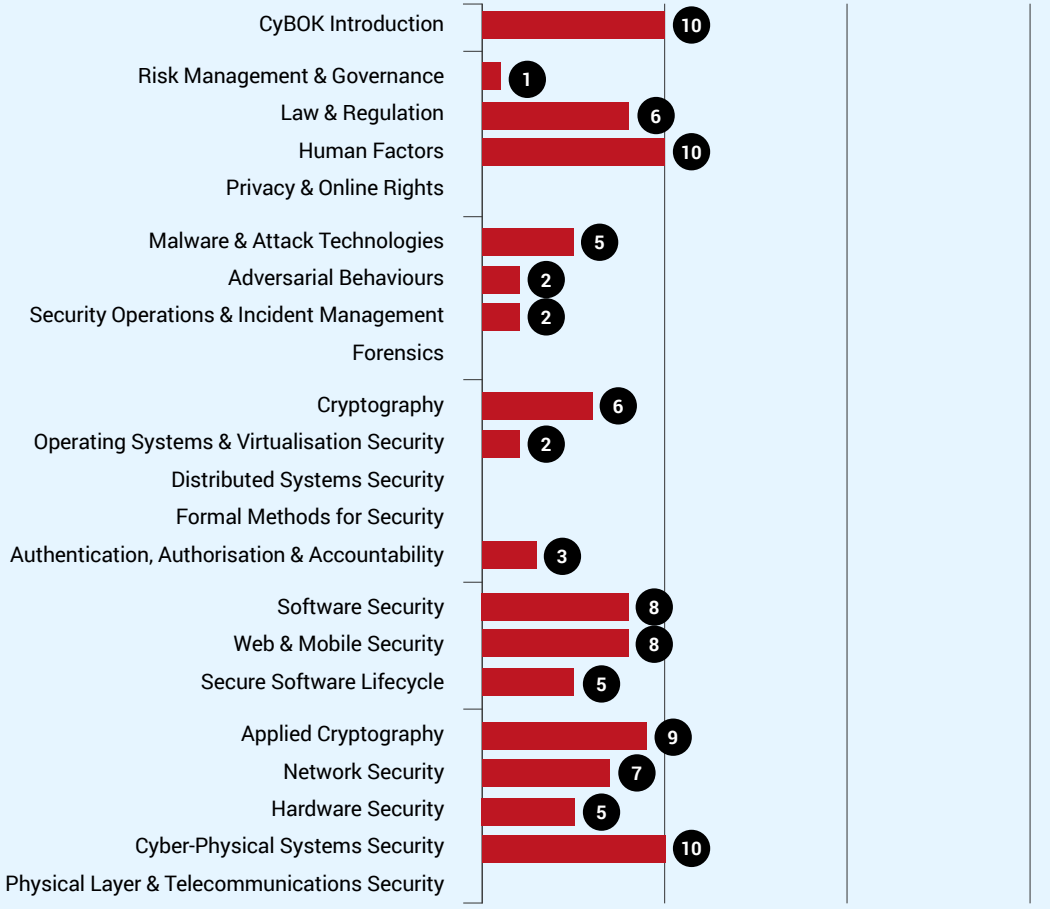
Number of credits

University of Southampton

MSc Cyber Security





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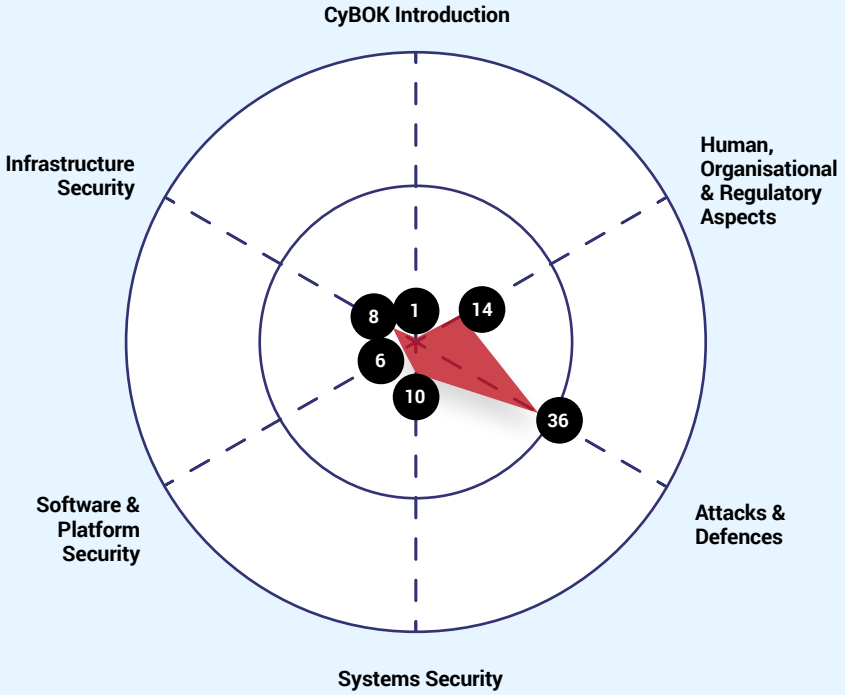
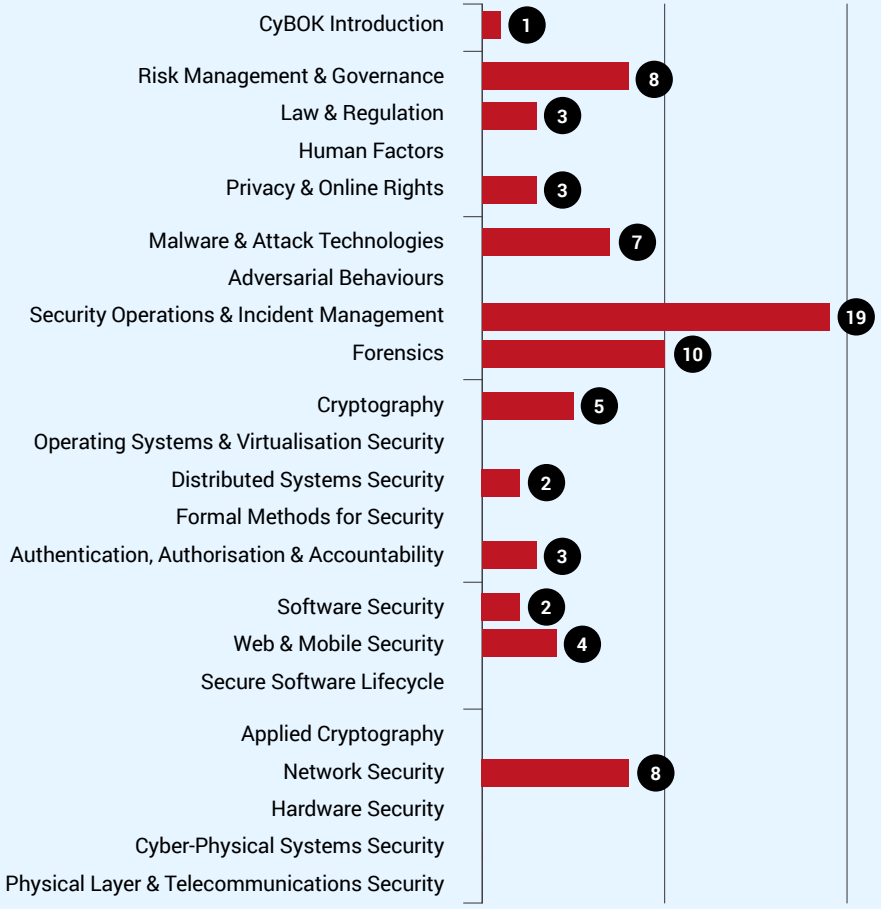
Number of credits

University of Strathclyde

MSc Cyber Security (Graduate Apprenticeship)



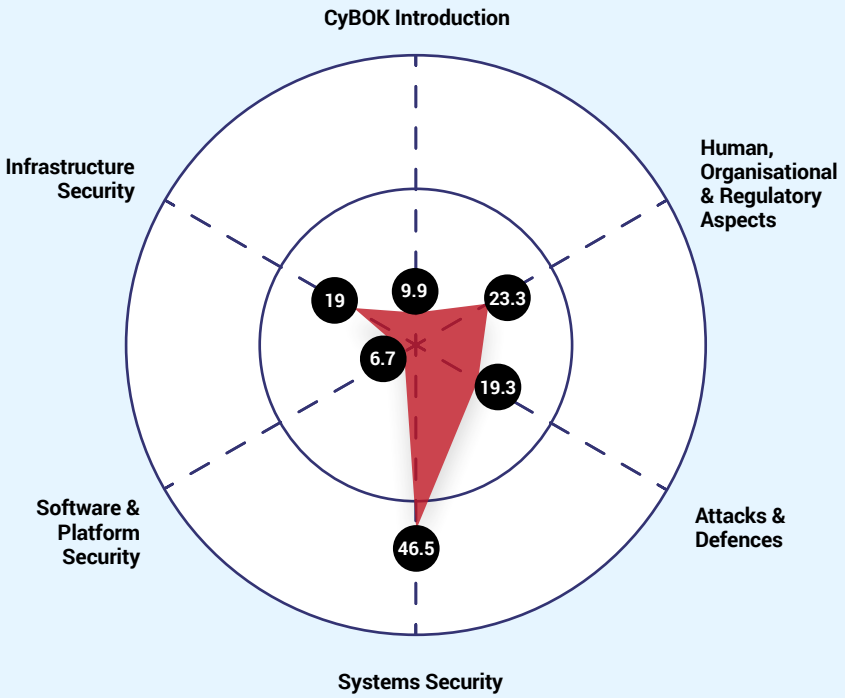


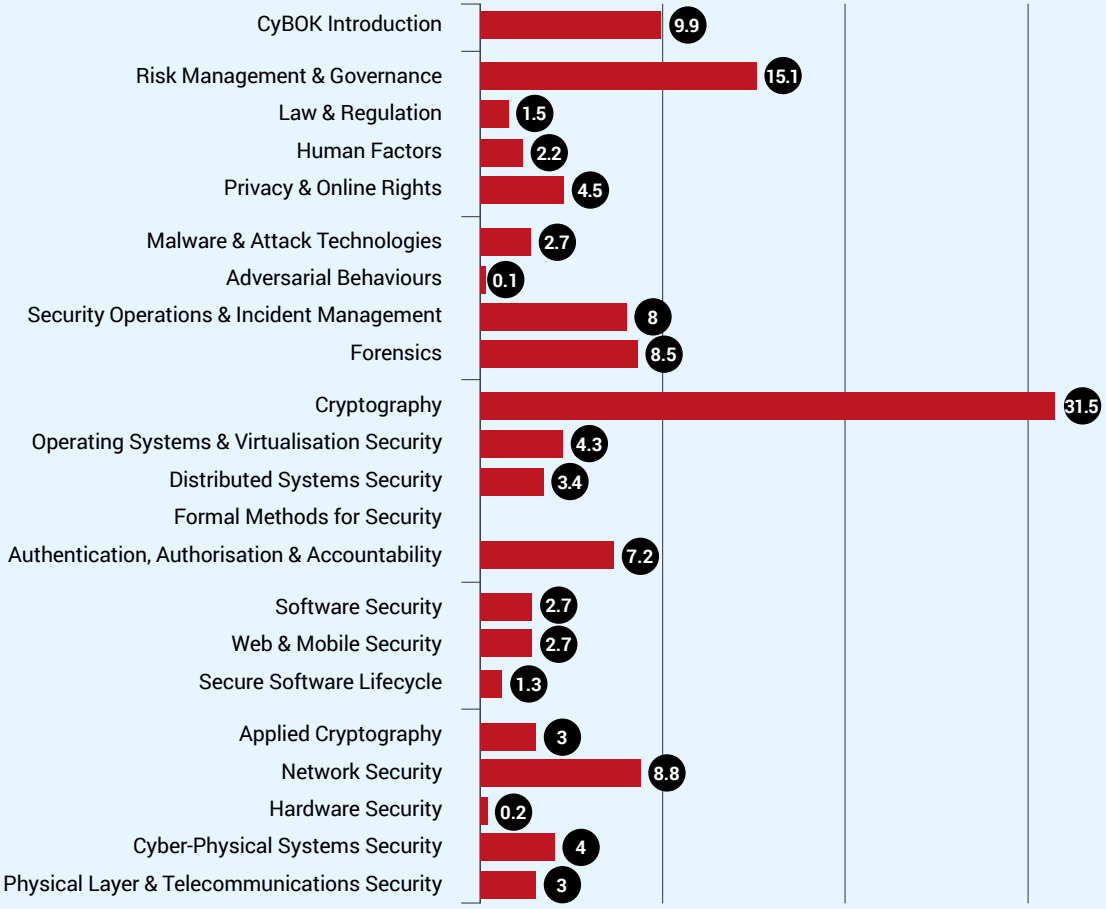
Mapped to CyBOK v1.1.0

Number of credits

University of Surrey

MSc Information Security





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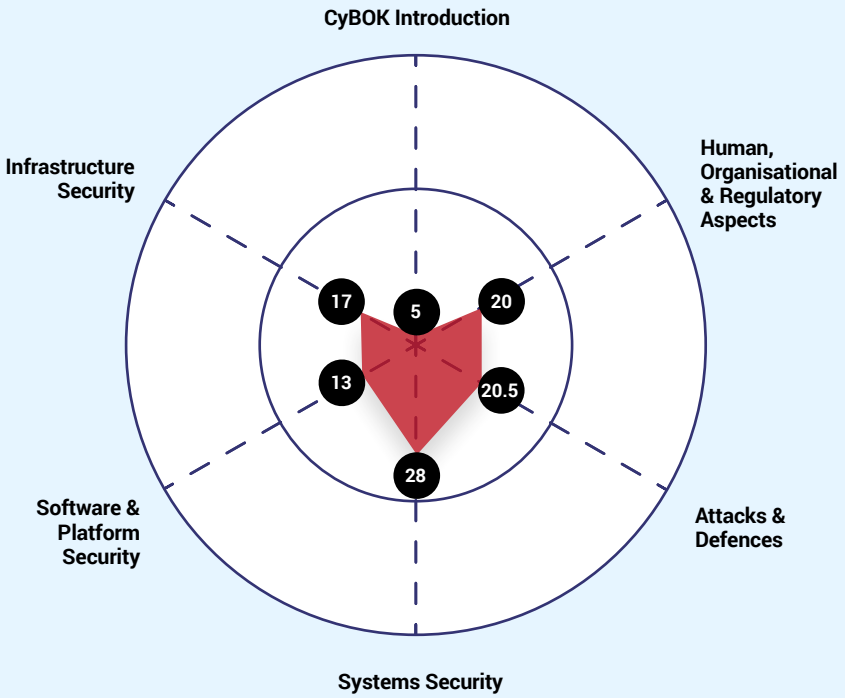
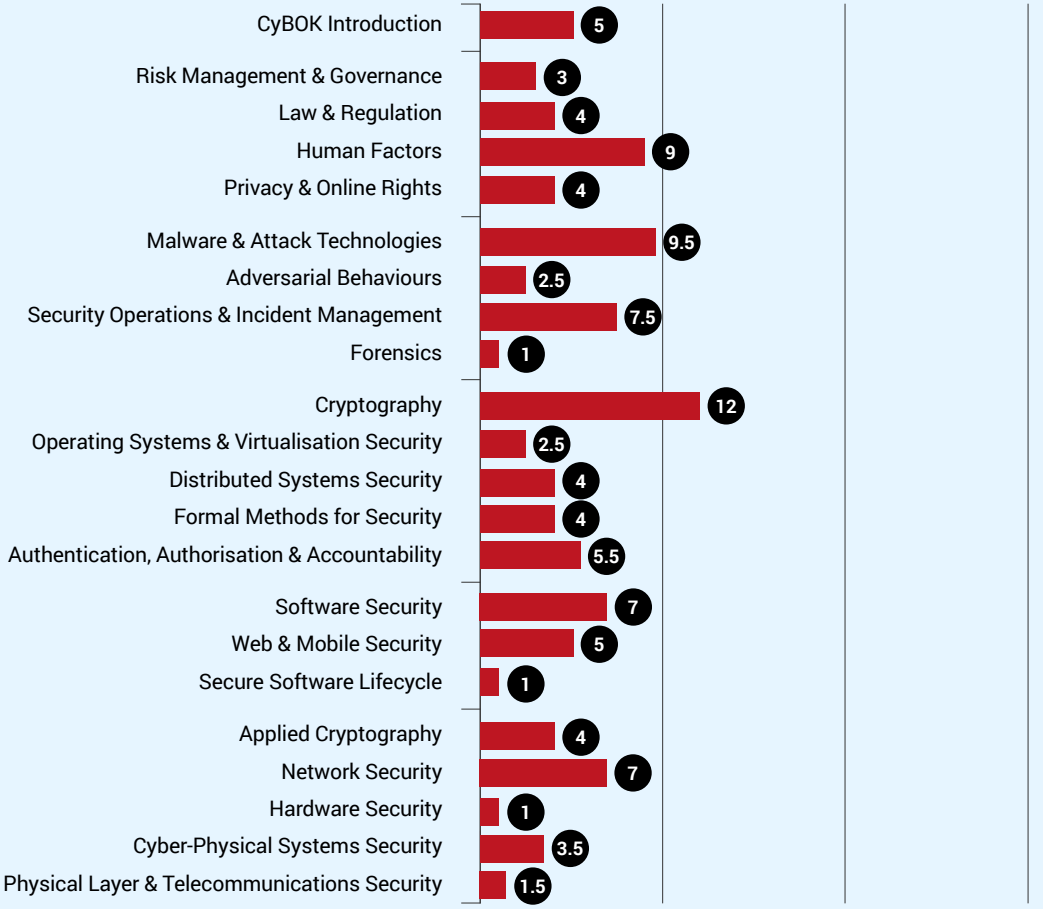
Number of credits

Swansea University

MSc Cyber Security (Core Modules + Typical Optional Modules Pathway)





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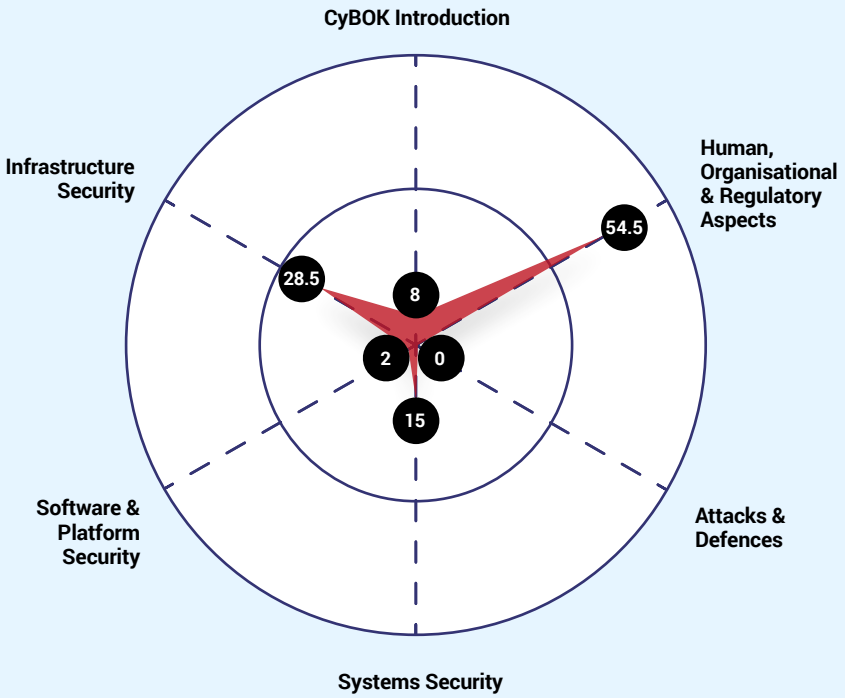
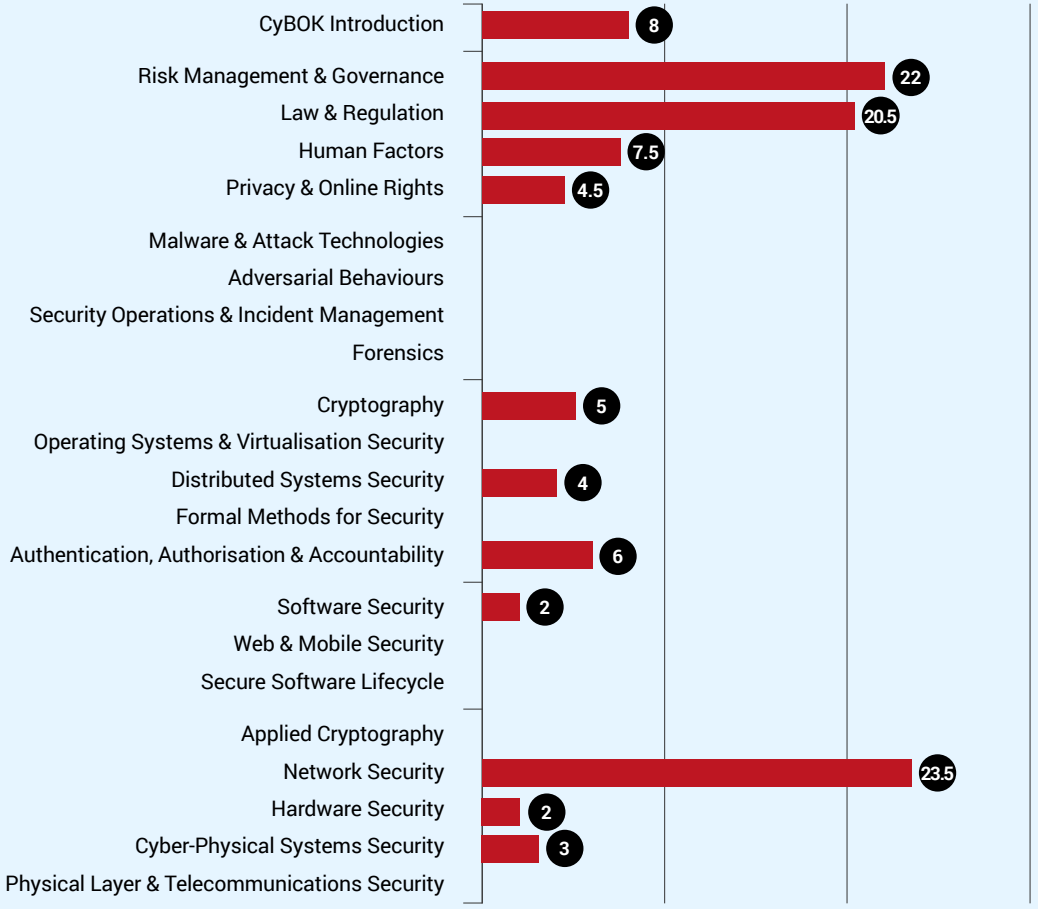
Number of credits

Teesside University

MSc Cyber Security





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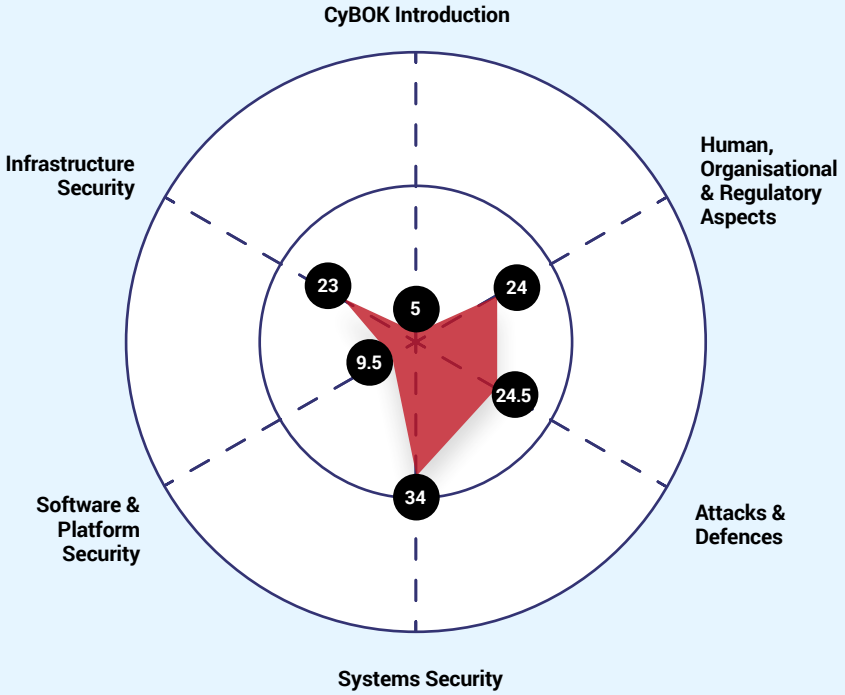
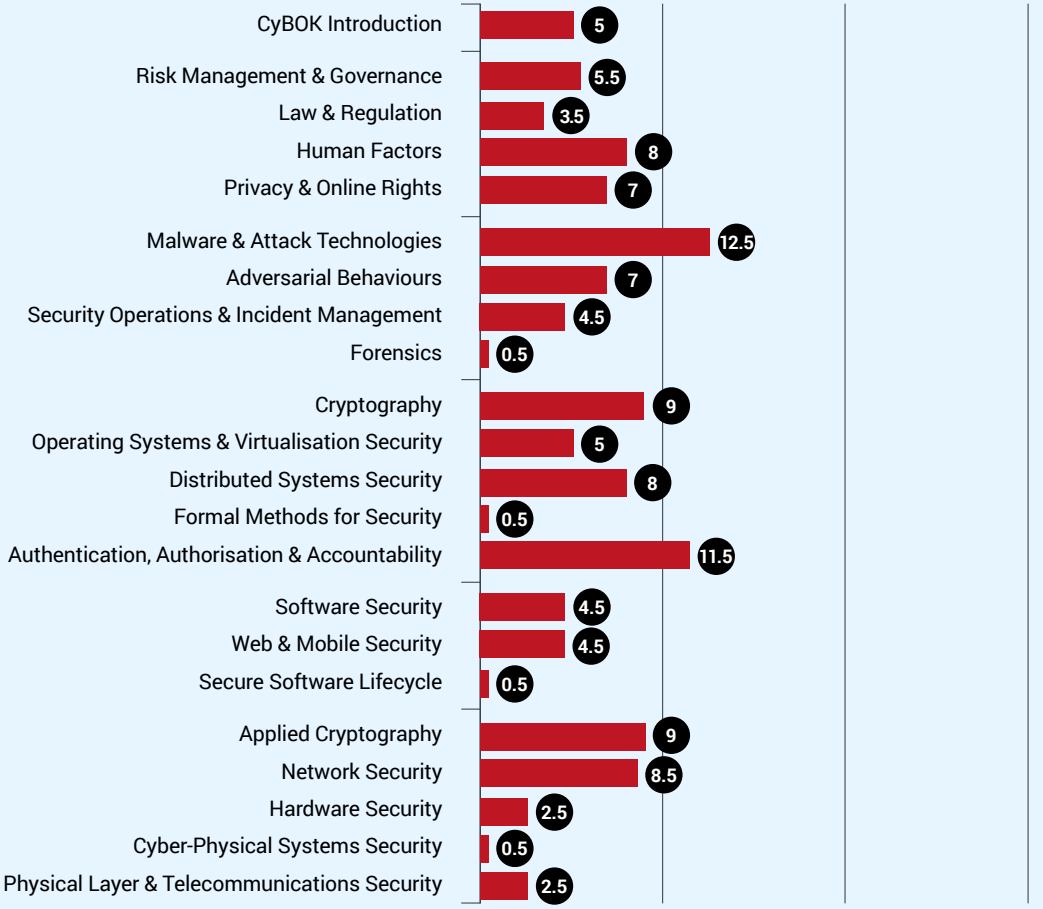
Number of credits

University College London

MSc Information Security (One of Several Pathways)



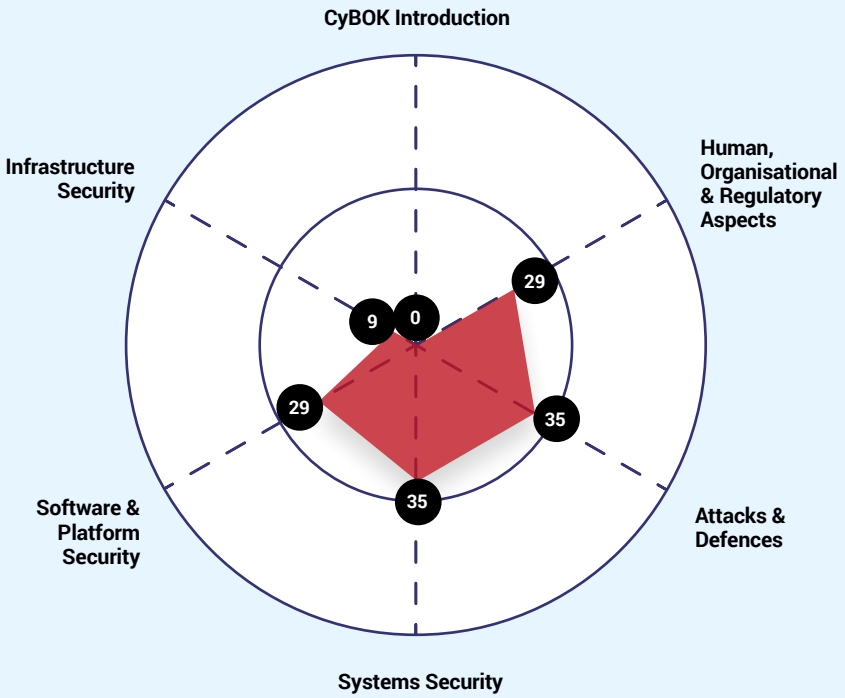


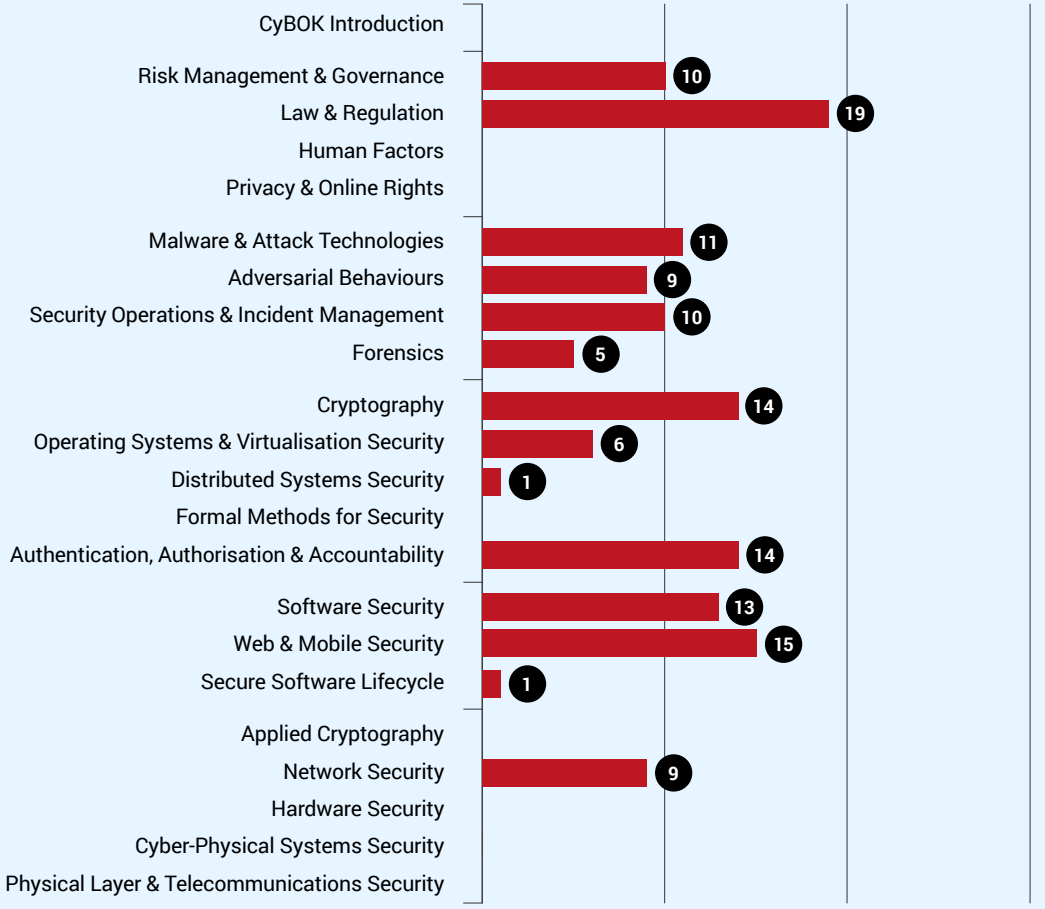
Mapped to CyBOK v1.1.0

Number of credits

University of South Wales

BSc Computer Security





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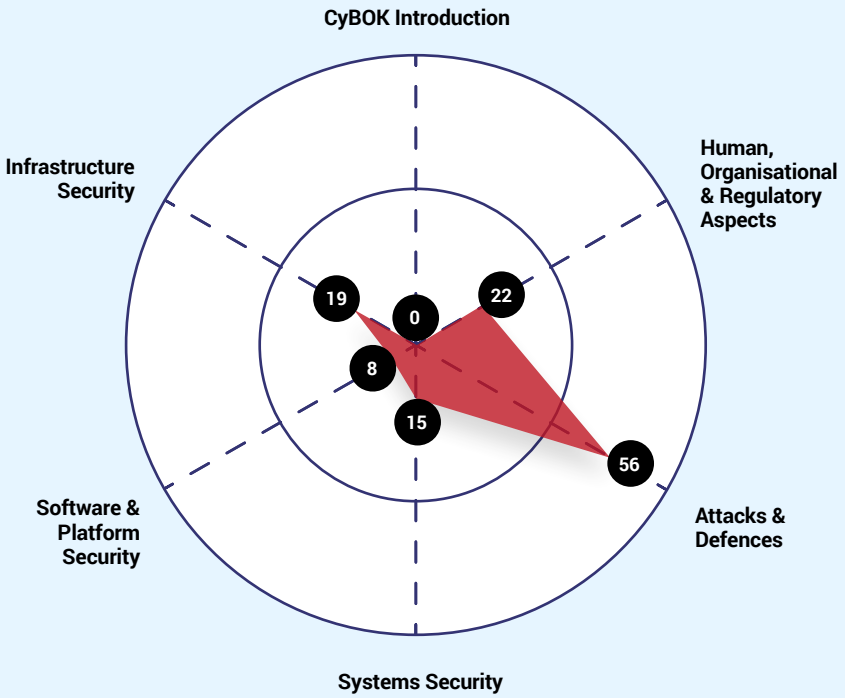
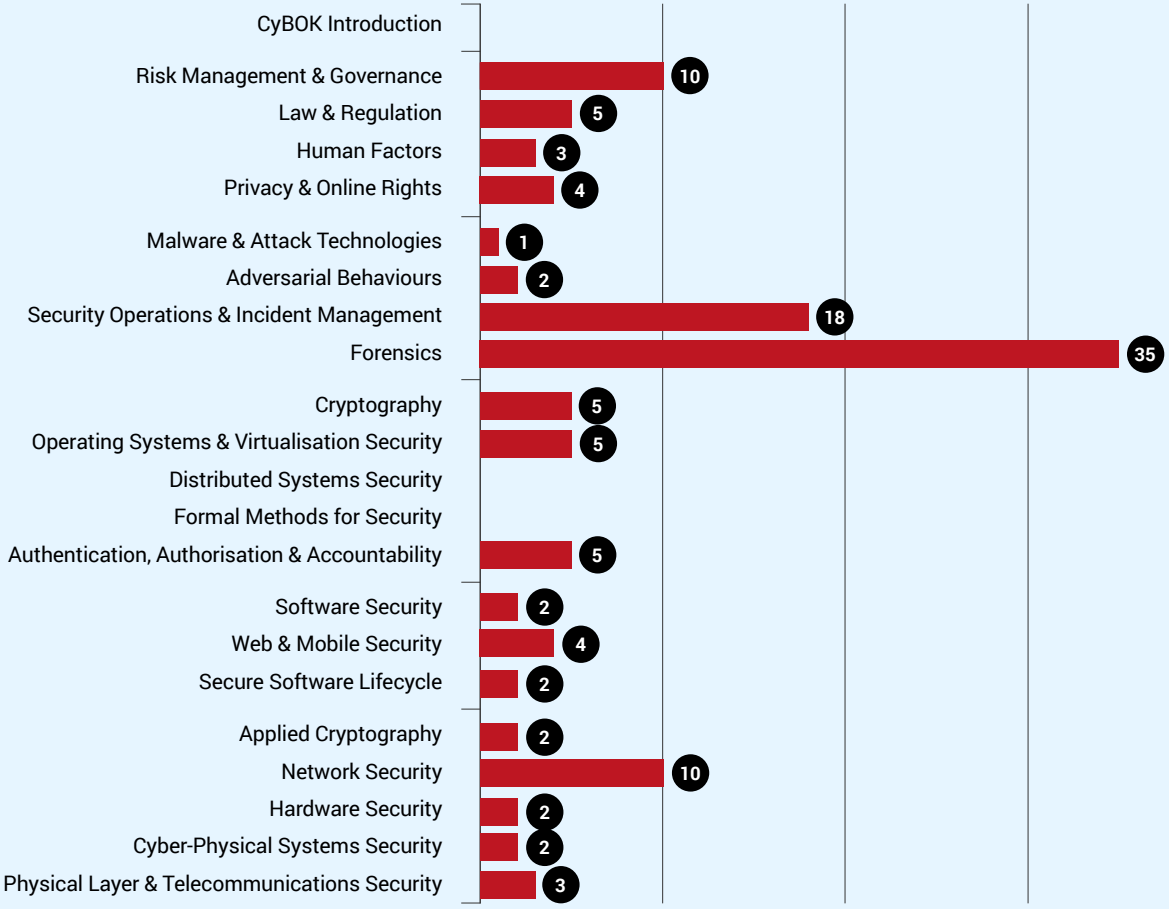
Number of credits

University of South Wales

MSc Computer Forensics





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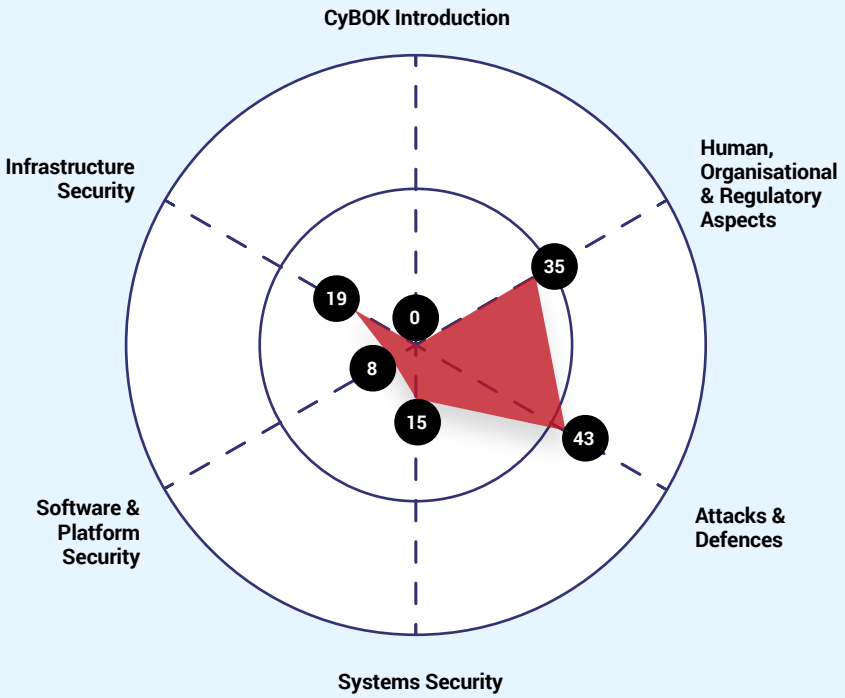
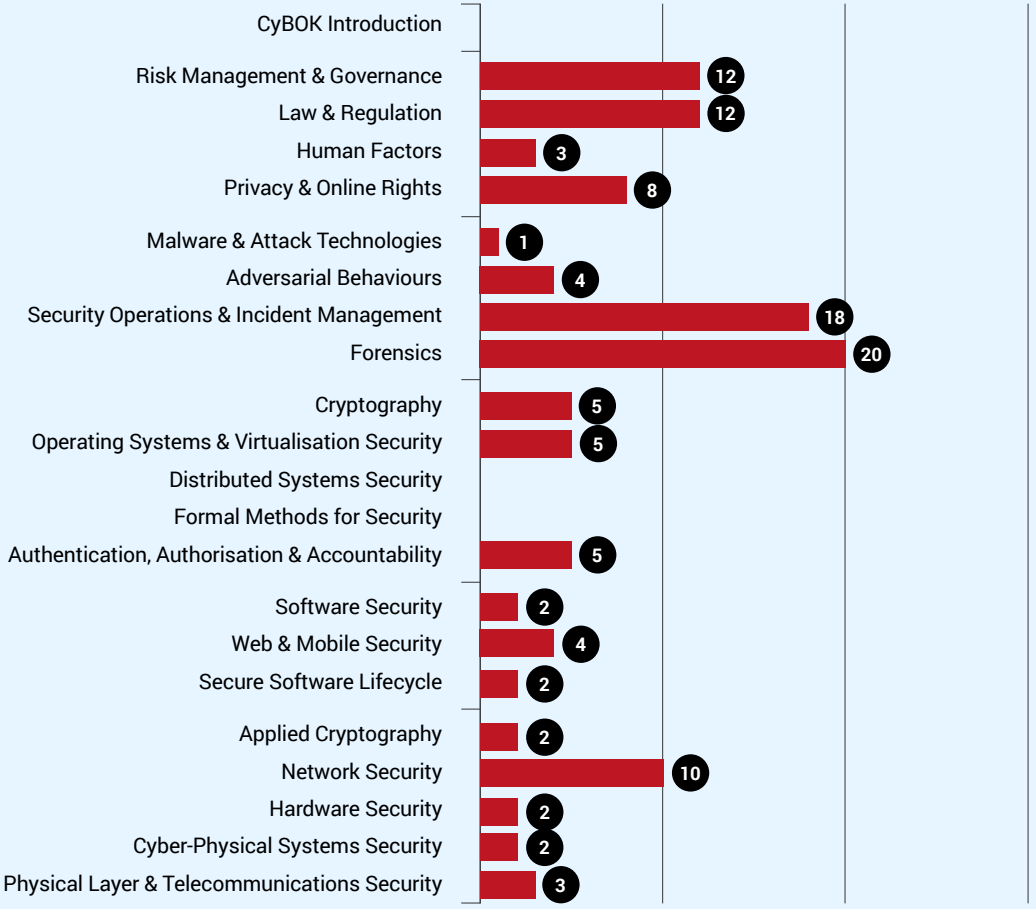
University of South Wales

MSc Cyber Security





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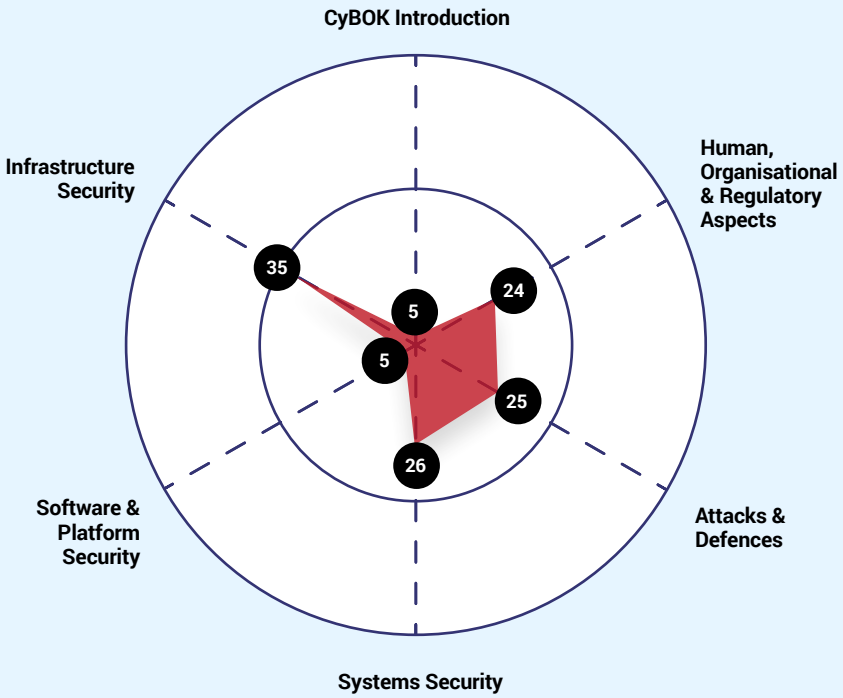
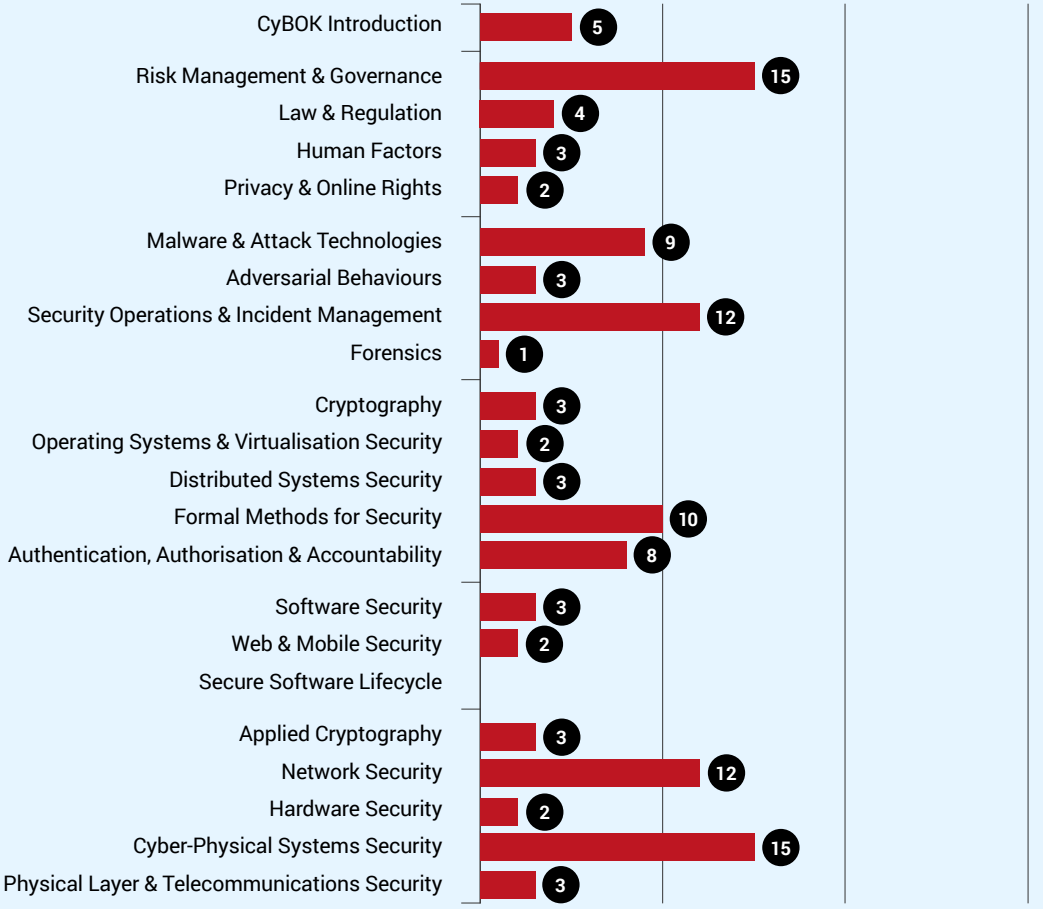
Number of credits

University of the West of England

MSc Cyber Security





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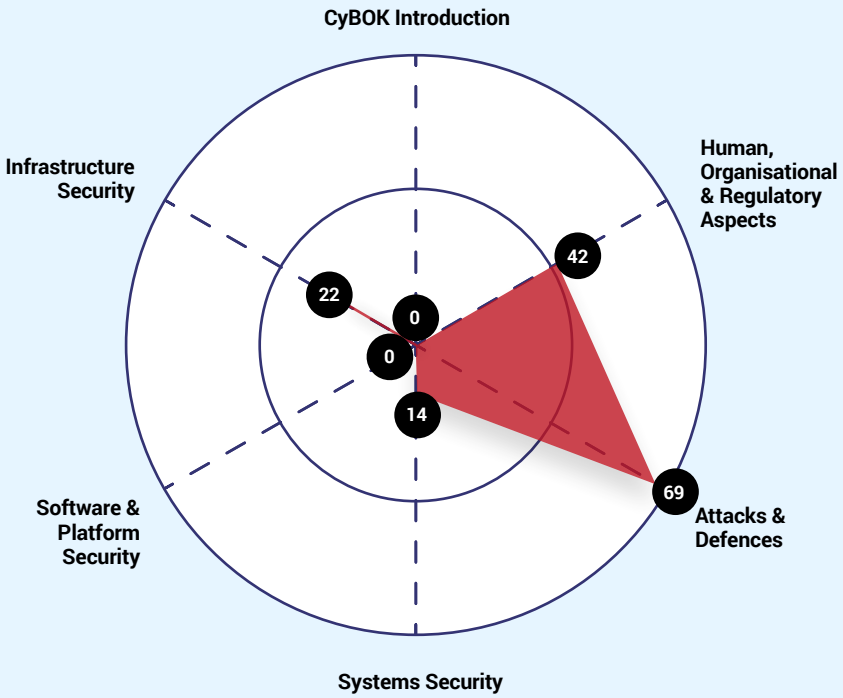
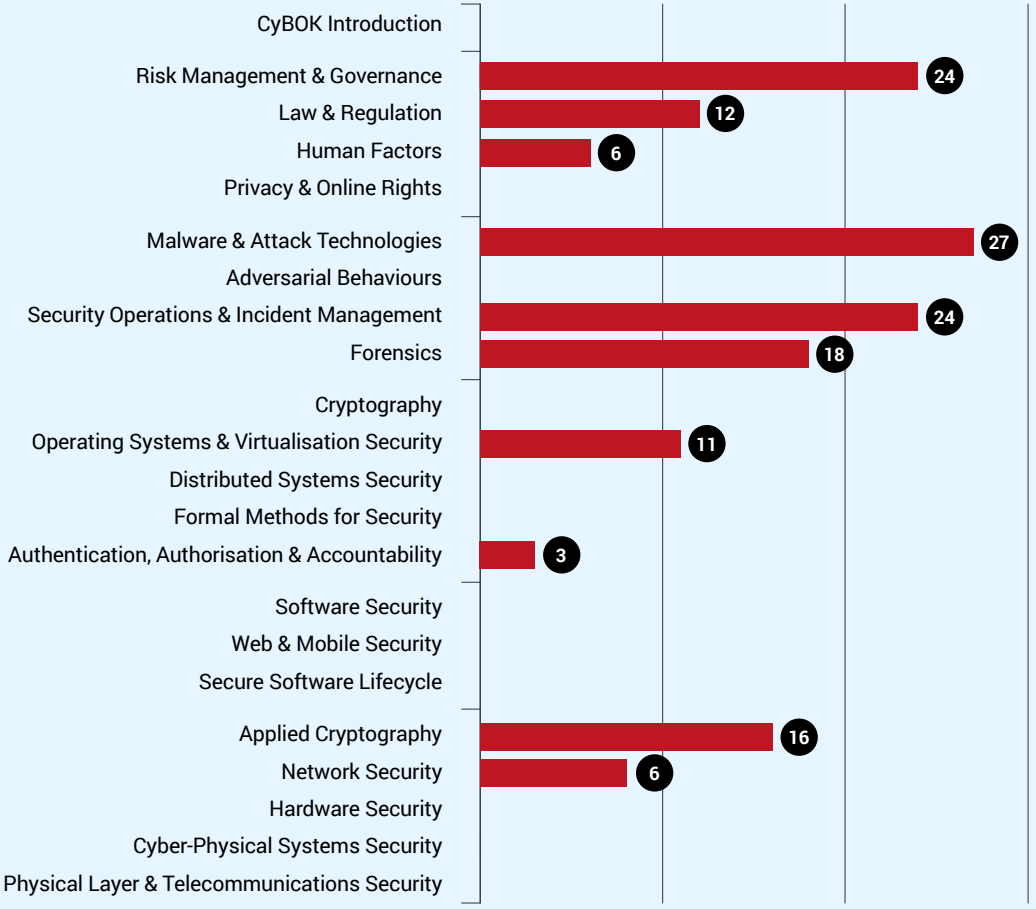
Number of credits

University of Warwick

BSc Cyber Security





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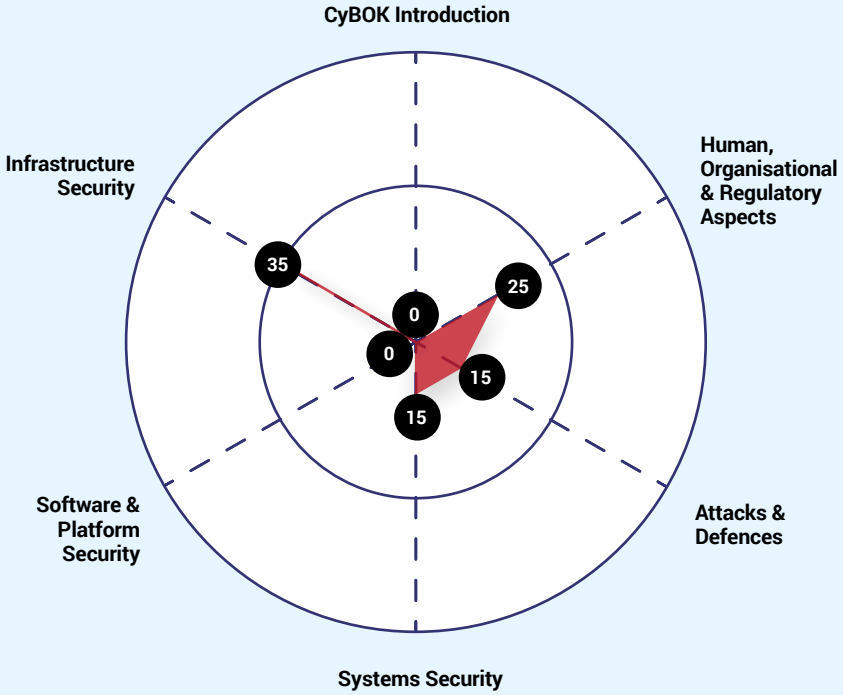
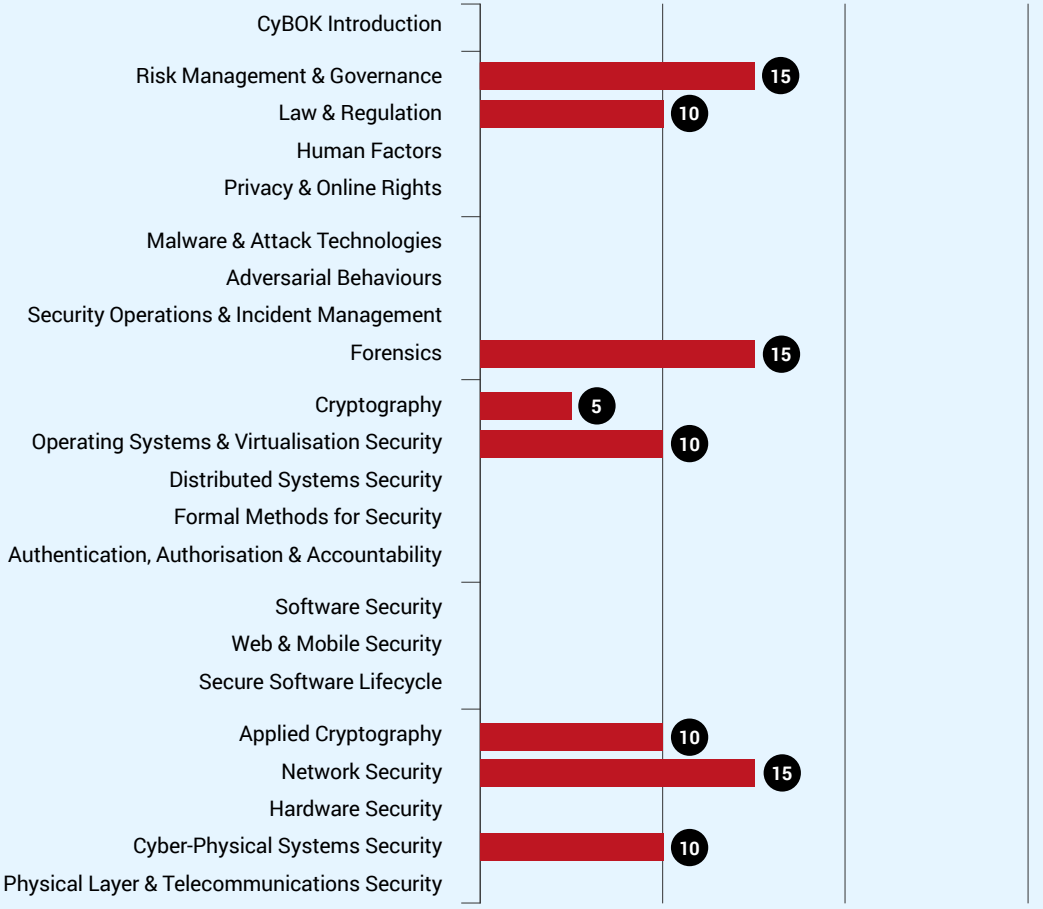
Number of credits

University of Warwick

MSc Cyber Security Management
MSc Cyber Security Engineering





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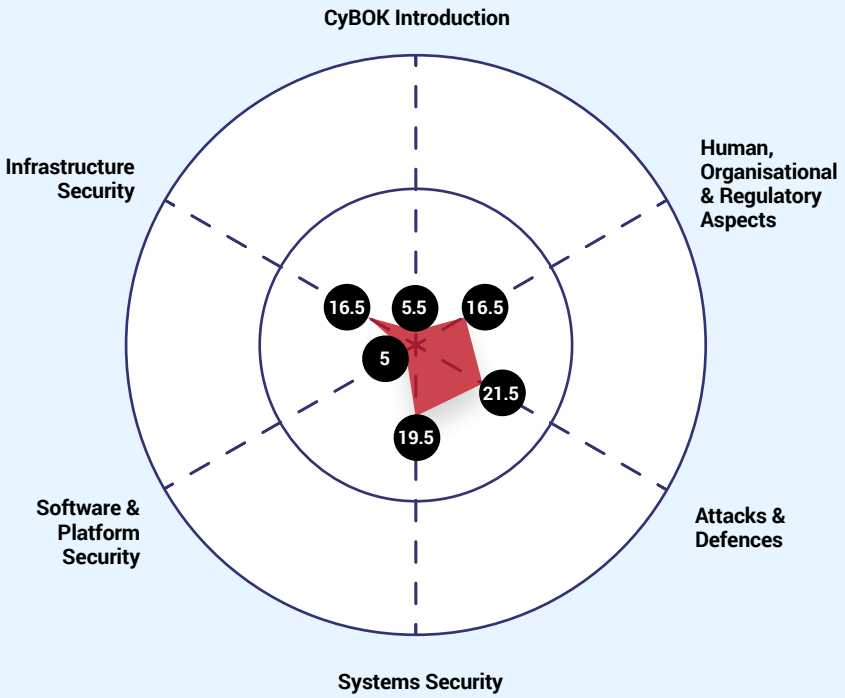
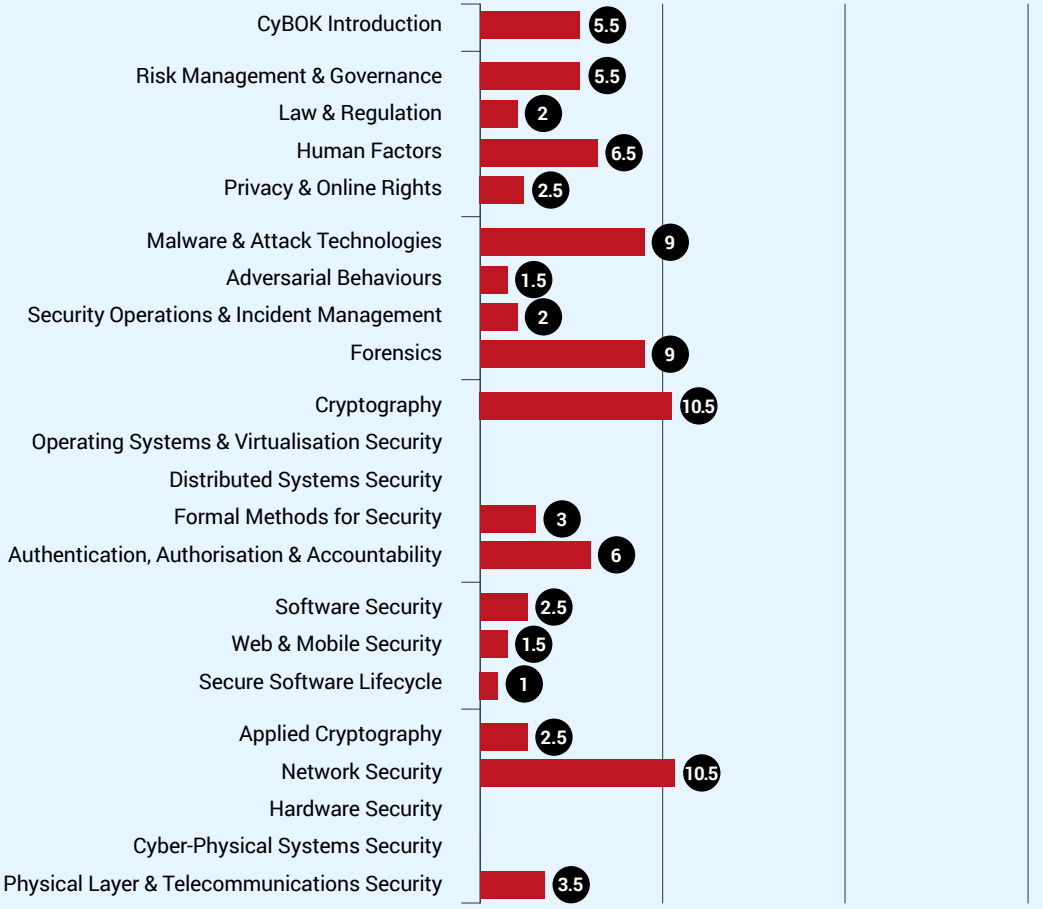
Number of credits

University of York

MSc Cyber Security





Mapped to CyBOK v1.1.0

Number of credits

Resources

The core mapping resources used are available on the CyBOK website:

- **CyBOK Version 1.0.0** An introductory webinar is also available, providing an overview of CyBOK, its background and the various use cases it enables.

  Click here for CyBOK v1.0.0

- **CyBOK Version 1.1.0**

  Click here for CyBOK v1.1.0

- **CyBOK Mapping Reference (version 1.1, 1.2 or 1.3 as appropriate)** – which provides a quick lookup mechanism for identifying the Knowledge Areas (KAs) where common cyber security concepts may appear within CyBOK.

  Click here for version 1.1

  Click here for version 1.2

  Click here for version 1.3

- Click here for information about the NCSC degree certification programme.

- **CyBOK Knowledge Trees** – which provide a hierarchical representation of the concepts covered for each of the KAs within CyBOK.

  Click here for version 1.0.0

  Click here for version 1.1.0

- **Tabular representation of CyBOK's broad categories, knowledge areas and their description** – providing a summary overview of the core elements covered within the detailed text of each KA.

  Click here

CyBOK has been developed through input and efforts from the cyber security community within the UK and internationally. The team welcomes further comments and feedback on updates to CyBOK as this is a resource developed for the community, by the community.

Contact us at: contact@cybok.org

CyBOK

The Cyber Security Body of Knowledge

University of BRISTOL

Bristol Cyber Security Group